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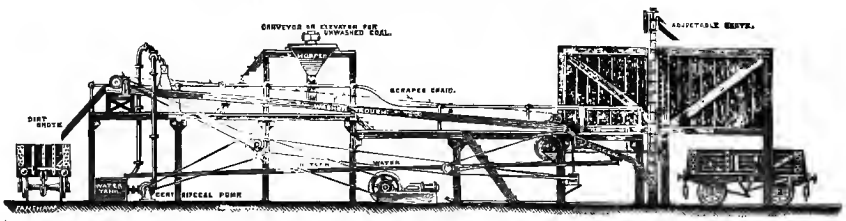

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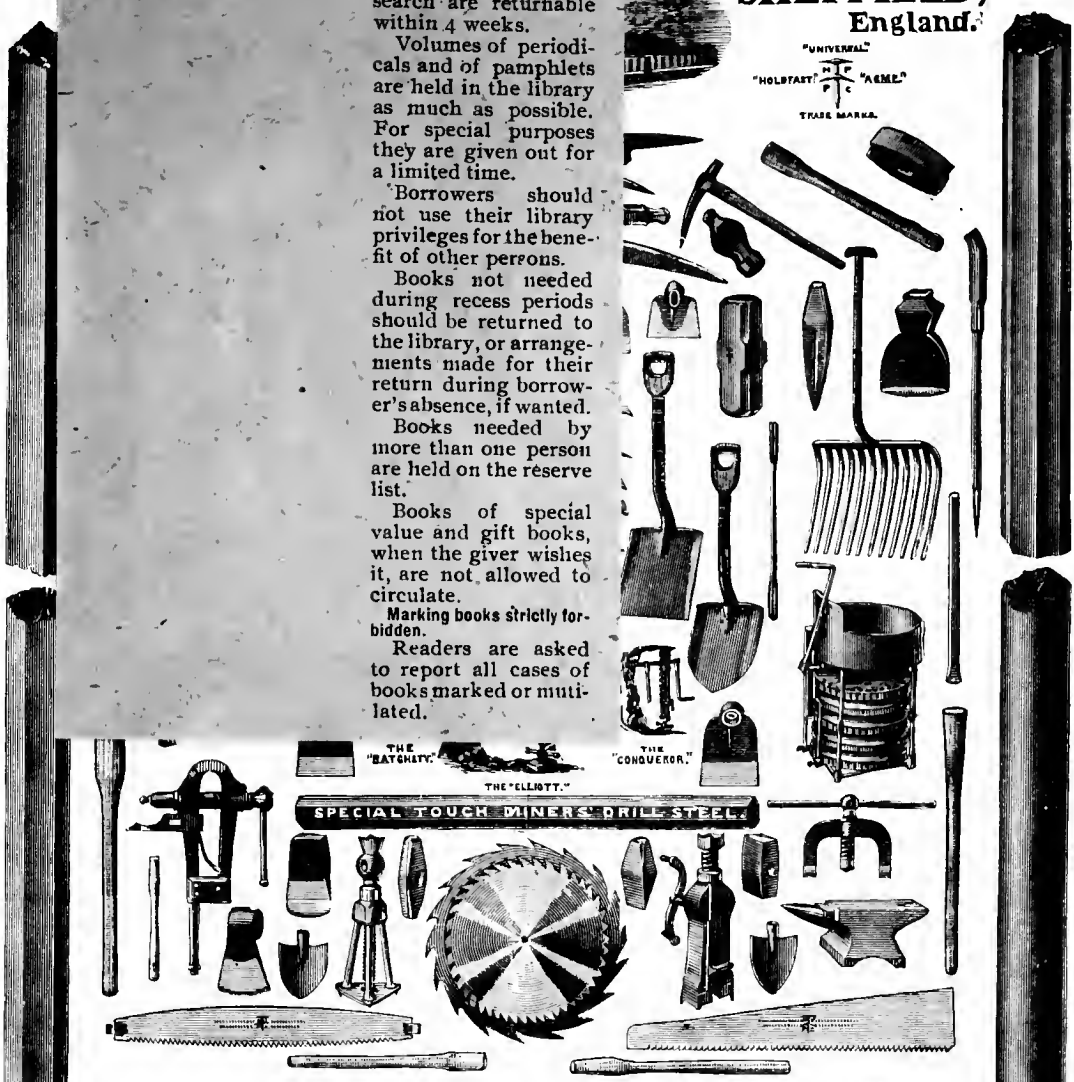

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Analyst—The *Quarry* Investigation, Testing and Analysis Department, London.
Date of Analysis—September 11, 1906.

The sample submitted is a strong hard coke, with good lustre, and is, in our opinion, a coke of superior quality, and very suitable for use as a best foundry coke.

Working test—Furnace 28 in. at tuyeres; bed 5 cwt. coke.

	Iron. Cwt.	Coke. Lb.
First charge	9	0
Second ,,	8	56
Third ,,	8	56
Fourth ,,	8	56
Fifth ,,	8	56
Sixth ,,	8	56
Seventh ,,	8	56
Eighth charge	8	56
Ninth ,,	8	56
Tenth ,,	8	56
Eleventh ,,	5	no coke
Iron melted	4 tons 5 cwt.	
Coke consumed, not reckoning drop	9½ cwt.	

Iron very hot. Type of furnace: receiver flat tuyeres.

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ANALYSES

OF

BRITISH COALS & COKE

AND THE

CHARACTERISTICS of the CHIEF COAL SEAMS WORKED in the BRITISH ISLES.

WITH COMMERCIAL INDEXES AND MAP.

Compiled by ALLAN GREENWELL, F.G.S., Assoc.M.Inst.C.E.

(Editor of the "Colliery Guardian")

And J. V. ELSDEN, F.G.S., B.Sc. (Lond.)

WITH AN INTRODUCTION,

The Classification of Coals and the Interpretation of Analyses,

BY

CLARENCE A. SEYLER, B.Sc. (London), F.I.C.,

Public Analyst for the Counties of Carmarthen, Glamorgan and Pembroke, and the County Borough of Swansea.

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CLASSIFICATION OF COALS,

AND THE

INTERPRETATION OF ANALYSES.

IN the following pages we have a collection of analyses and assays of British coals and cokes classified according to the district from which they are derived. These analyses seem mostly to represent samples sent by the producers to the analyst and circulated as an indication of the quality of the coal. This raises the very important question of the method of sampling adopted. In some cases, from the nature of the assay, fairly large quantities of coal must have been used. In others, however, there can be little doubt that the analysis represents a picked sample and not an average one. Thus, when we find an analysis with about 0·6 per cent. of ash, we may feel fairly confident that this cannot represent the average of any large quantity of coal. For certain purposes it is permissible and even desirable to pick a sample as free as possible from impurities for analysis—namely, when it is desired to arrive at a judgment of the nature of the true combustible substance or pure coal. A large quantity of impurities such as ash or sulphur interferes to a great extent with the correct analysis of a coal. When, however, the nature of the coal is known, it is the average quantity of the impurities, ash, sulphur, phosphorus, or arsenic, which is of importance. To obtain a small sample which shall fairly represent these impurities is not an easy matter. It is to be regretted that a careful sampling by an expert and impartial sampler is not oftener resorted to. A certificate of correct sampling attached to each analysis would largely increase its value in the eyes of those who buy coal. The ideal would be a complete analysis upon a picked sample as free as possible from impurities, together with a partial analysis upon a certified average sample. Some firms have already seen the necessity of this, under the pressure of the scepticism with which the analysis of selected samples is met, and at least one example is to be found in this collection.

This is not the place to enter into a discussion of the best methods of obtaining an average sample, but it must be pointed out that no haphazard method is of any use. Systematic procedure must be adopted upon the lines which are universally used by buyers and vendors in the sampling of minerals. No analysis, however accurate, can be of greater value than is determined by the care devoted to the sampling.

Of the numerous results to be found in this collection, very many are not "analyses" in the strict sense of the word, but rather "assays" or tests. This is obvious in the case of the tests usually given of gas coals, which are the results of actual trials of the coal for gasmaking purposes on a small scale. But it is not always equally obvious that a determination of the "volatile matter," or even of the ash, is not really an analysis but an assay. The estimation of the sulphur, phosphorus and arsenic, or the ultimate composition (the percentage of carbon, hydrogen, oxygen and nitrogen) are true analyses. They are determinations of the actual amounts of certain definite elements, and are not subject to any ambiguity of meaning. It is far otherwise with such results as "volatile matter."

The manner in which coal breaks up upon heating varies very greatly with the time and temperature and the nature of the vessel in which it is heated. It is a highly-complicated and destructive distillation, and is not capable of being represented by any simple chemical equation. The results of different analysts cannot be expected to agree unless all use a standard method. In the case of coals containing a very high volatile matter, these differences may be enormous. In the present collection of results there is in no case any indication of the method employed for the determination of the volatile matter, and it is therefore very doubtful how far the results of one analyst are comparable with those of any other. There are certain methods which have obtained a wide recognition, and it would be very desirable in future that all assays for volatile matter should be made by one of these processes, and accompanied by an indication of the method employed. Leaving aside the older method of Hinrichs (*Chem. News*, vol. xviii., p. 53), in which the powdered coal was heated in a platinum crucible for three and a-half minutes over an ordinary Bunsen burner, and then for three and a-half minutes over the blow-pipe, there are practically only two methods of wide acceptation in which the conditions of treatment are exactly laid down, that of *Fresenius and Muck*, widely used on the Continent, and that of the Committee on Coal Analysis appointed by the American Chemical Society, which we may call the *American Official Method.* In view of the fact that this determination is a purely conventional one—that is to say, has only a definite meaning when it is agreed to follow exactly certain directions—it may be acceptable to

coal users and buyers to have these conditions before them, and they are therefore given in this place.

Method of Fresenius and Muck (Fresenius, *Quant. Chem. Anal.*, vol. 2, section 272). A quantity of the (powdered) coal not exceeding 1 gramme, or even less with strongly caking coal, is placed in a platinum crucible with a closely-fitting lid (except, of course, at one place for the escape of the gases). The crucible must have a large surface, and for very gassy coal be over 30 mm. in height. It is placed on a triangle of *thin* platinum wire, so that the bottom of the crucible is 30 mm. distant from the top of a Bunsen burner fitted with a chimney, and having a flame not less than 18 cm. high when burning free, until any flame issuing between the crucible and lid has almost entirely disappeared.

The variation in the results is said to be usually far under 1 per cent. This method, while it is no doubt good for caking coals, is not altogether definite, and in my opinion unsuitable for anthracites or coals low in volatile matter, and I much prefer the American method.

Method of the American Coal Committee (*Journal* Am. Chem. Soc., vol. xxi., pp. 1122-1126).—"Place 1 gramme of fresh undried coal in a platinum crucible, weighing 20 or 30 grammes, and having a tightly-fitting cover. Heat over the full flame of a Bunsen burner for seven minutes. The crucible should be supported on a platinum triangle with the bottom 6 to 8 centimetres above the top of the burner. The flame should be fully 20 cm. high when burning free, and the determination should be made in a place free from draughts. The upper surface of the cover should burn clear, but the under surface should remain covered with carbon. To find 'volatile combustible matter' subtract the percentage of moisture from the loss found here."

Even when these directions are carefully followed, not inconsiderable differences may occur according to the moisture and fineness of the coal, size of crucible, &c. Usually the duplicate may be expected to agree within about 0·5 per cent.

In every case, if the volatile matter is determined upon the moist coal, the water must be deducted, and the volatile matter calculated upon the dry coal. It is not always made perfectly clear in this collection of analyses whether the moisture has been deducted. The terms "volatile combustible matter" or "volatile hydrocarbons" sometimes used are not strictly correct, since a variable proportion of the decomposition products consists of water. The simple term "volatile matter" is better, provided it is understood that its production is due to decomposition of the coal and not to simple volatilisation. Far greater objection, however, must be taken to the expression "fixed carbon," which is here so frequently employed for the residue left after expelling the volatile

matter and deducting the ash. This should be described as "fixed combustible residue" or "fixed carbonaceous residue." It is true that it consists very largely of carbon, so that it may be thought merely pedantic to object to the term "fixed carbon." But as a matter of fact it is very far from being pure carbon and contains frequently large percentages of oxygen, nitrogen, and sulphur, and even hydrogen. To call it "fixed carbon" is very misleading, since it is often confused by commercial men with the true carbon, which is reported in the ultimate analysis. Thus in the case of anthracites we find that the "fixed carbon" is often actually greater than the total carbon, which is absurd and perplexing to those who are not chemists. Still less to be defended is the idea of "volatile carbon" when obtained by deducting the so-called "fixed carbon" from the total carbon. In anthracites this would often work out to a negative quantity! The true amount of fixed carbon could be obtained by an ultimate analysis of the fixed residue, but it would not be worth the trouble considering the conventional nature of the "fixed carbonaceous residue" itself.

An excellent practice has been followed by some analysts of giving a careful description of the nature of the coke or fixed residue left upon heating the powdered coal. An equally commendable practice is that of giving a description of the mechanical nature and physical qualities of the coal in the lump state, though of course this is not possible when the coal has been broken down for the purposes of sampling. It is desirable in such cases that a specimen lump should also be sent in order that these characteristics may be recorded.

Even the amount of *ash* in a coal is not quite free from ambiguity unless the determination is always made in the same way. The ash, as is well known, does not correctly represent the mineral matter present originally in the coal. By the process of combustion, water and carbonic acid present in such mineral matters as clay and carbonate of lime are expelled, while a portion of the sulphur is driven off from pyrites and a part remains behind as sulphates. These reactions vary according to the temperature and supply of oxygen during the combustion, so that it is quite usual to find that the ash determined by combustion in an open vessel is lower than that obtained in a combustion tube in a current of oxygen. The amount of sulphur left in the ash will also differ in the two cases. That part of the sulphur remaining in the ash after the combustion made for the ultimate analysis must be estimated and deducted from the total sulphur, or it will appear twice in the complete analysis. The difference between the total sulphur and that remaining in the ash is sometimes spoken of as the "combustible sulphur," but it is seldom sufficiently clear in the published analyses whether this or the total sulphur is meant. In most cases the difference between the two is not great, but this is not invariably the case.

By the *ultimate analysis* we mean the actual percentage of the elements carbon, hydrogen, nitrogen and oxygen present in the coal. The correct estimation of the carbon and hydrogen is a matter of some delicacy, but with care is capable of considerable accuracy. Duplicate analyses should always be made, and should agree to about 0·20 per cent. in the carbon, and to considerably less than 0·10 in the hydrogen. Differences of anything like 1 per cent. in the carbon or 0·5 in the hydrogen should never occur. To report the carbon and hydrogen, however, to three places of decimals, as is sometimes found, is absurd. The *nitrogen* can be fairly readily determined by the use of modern methods, and is chiefly of importance in cases where it is desired to recover ammonia and other nitrogen compounds from the products of distillation. If this is not required, the oxygen and nitrogen are frequently counted together, and often pass as "oxygen." At any rate, the amount of oxygen is invariably determined as the difference between 100 and the sum of the other elements. It therefore bears the accumulated errors of analysis, as well as the error introduced by considering the ash as representing the mineral matter. For these reasons it is not suitable for purposes of classification.

The ultimate analysis, as far as concerns the carbon and hydrogen, is a perfectly definite thing, and not dependent (saving errors in analysis) upon any convention as to the mode in which it is determined. It is, therefore, an exceedingly valuable datum, and no investigation of a coal can be considered complete without it. Its value is becoming increasingly appreciated as we are gradually learning to interpret the results.

It is one thing to be able to make an accurate analysis of a coal, and quite another to be able to express the results so that they shall be intelligible and comparable with other analyses, and yet another problem to interpret the results when so expressed.

The best way to express the results, so that they may be comparable with each other, is a matter demanding attention. The results appear unintelligible as long as they are complicated by the inclusion of matters which are *not coal*, either water or mineral matters. The amounts of water, ash and sulphur (in the form of pyrites) are very important to the coal user by reason of the fact that they are impurities. But for the purpose of comparing the composition of the true coal they are accidental and unessential, and must be eliminated before any rational comparison can be made. It is usual to include the "combustible sulphur" with the moisture and ash as impurities, and to calculate the composition of the coal after their elimination. This can be done as follows:—Subtract the percentage of moisture, ash and sulphur from 100. Divide the percentage of carbon, hydrogen, &c., by this number and multiply by 100, and the

results express the composition which the coal would have if it were composed purely of carbon, hydrogen, oxygen and nitrogen. Expressed in formulæ, we may put the matter thus: Let W be the percentage of moisture, A the percentage of ash, and S the percentage of combustible sulphur, then multiply the percentage of each constituent (C ,H, O and N) by the factor

$$\frac{100}{100 - (A + W + S)}.$$

A few analysts whose results figure in this collection have followed the example set by Dr. Percy and made this calculation upon their certificates and given not only the composition of the dry sample, but the "composition per cent. exclusive of sulphur, ash and water." This is an excellent example and should be more widely followed, as it would conduce largely to a proper understanding of the meaning of the analysis. The necessity of this will easily be seen if we consider, for instance, two samples of anthracite both of exactly the same nature but containing respectively 1 per cent. of ash and 10 per cent. The ash in the latter case may be derived from admixture with shale, roof, or floor. Suppose the anthracite in the pure state to contain 93 per cent. of carbon, then in the first case the carbon will be reduced to 92 per cent., and in the latter to 83·7 per cent. The coals will appear to be entirely different, whereas elimination of the ash will show them to be identical. Thus real identity and real diversity are alike hidden, and all possibility of comparison is lost. It is neglect of this consideration which causes many commercial men to conclude that chemical analysis is of no value. The same calculation must be applied to the volatile matter and calorific power, since all these values are simply decreased, or as it were diluted by the presence of the impurities. It is true that the sulphur may contribute to the calorific power, but if present as pyrites this effect does not belong to the coal proper.

Having considered the proper form in which to express the results of analysis, let us now turn to the question "How are we to interpret these results?" What conclusions can be drawn from them as to the nature of the coal and the purposes for which it is suitable?

After we have made a decision on this point, we may give due weight to the amounts of impurities present according to the purpose to which we wish to apply the fuel. In the first place, we do not wish to pay for moisture at the price of coal. Further, the moisture not only diminishes the calorific power, but represents so much additional water to be evaporated. Again, the amount of ash not only dilutes our fuel, but represents so much inert matter to absorb heat, to obstruct draught, diminish caking power, and carry unburnt fuel away with it. Its fusibility or liability to clinker, its composition, the amounts of iron, silica, sulphur, phosphorus, and arsenic may also be of importance.

We require, however, information as to the positive properties of the coal, its calorific power, caking power, yield of coke, length of flame, amount of smoke, mechanical properties, rapidity of burning, and other factors, which together go to make up the character of the coal.

The direct determination of the yield of volatile matter and calorific power will give us positive information upon some of these points, but others are not easily expressed in quantitative form.

For the purpose of "clearly conceiving and retaining in the memory the characters" of a given coal we require to be able mentally to *classify* it. By this we mean that we require to gather together into separate classes all those coals which are alike in as many particulars as possible, and to separate them from those which are unlike. The purpose of the classification is therefore eminently a practical one. It is the solution of the question which continually faces the analyst or the coal-user when called upon to decide upon the character of a coal, and its suitability for a given purpose.

We may classify coals by many properties: by their physical appearance, their calorific power, their yield of volatile matter, or their composition. The most useful classification will evidently be one which chooses a property which is a cause, or at any rate an accompaniment, of as many other properties as possible. Some sort of rough classification is universal. In the first place there are the commercial classifications, such as we shall find appended in this collection. These are based either upon the purpose for which the coal is considered to be most useful, such as gas, house, steam, coke, smith's or manufacturing coal, or upon the physical properties or behaviour on burning, as in the terms Anthracite, Bituminous, Semi-bituminous, Cannel, Splint, Lignite. The former terms are not definite, since many coals are equally well suited for various purposes. The latter terms are useful, but are so far ill-defined, and usage in different districts varies. Terms like Anthracite, Semi-anthracite, Bituminous, Semi-bituminous, Lignitious and Lignite are, however, the expression of the general characters of certain fairly well marked kinds of coal, and if they can be made definite will form a suitable basis for naming the various classes.

Many attempts have been made to define these classes upon the basis of chemical composition or assay. One of the commonest is that which uses the amount of volatile matter. Such, for instance, is the classification of Hilt (1873), based upon the volatile matter expressed as a percentage of the fixed carbonaceous residue, $\frac{V}{(1 - V)} \times 100$. This is in principle precisely the same as that proposed by P. Frazer and widely used in America, which depends upon

the so-called "fuel ratio," $\frac{1 - V}{V}$, or ratio of the fixed carbonaceous matter to the volatile matter. These depend upon the amount of volatile matter alone, and it is often forgotten that there is no special virtue in the particular form of ratio chosen. They are only disguises of the amount of volatile matter in the pure coal, and if they possess any greater value than this it lies only in the ease with which the calculation is made from the results of the analysis. Thus to convert Frazer's classification into terms of volatile matter we have :—

	Fuel ratio.	Volatile matter.
Anthracite	100 to 12	7·7 and under (to 0·99)
Semi-anthracite ...	12 to 8	7·7 to 11·1
Semi-bituminous ...	8 to 5	11·1 to 16·7
Bituminous	5 to 0	16·7 and over (to infinity!)

This agrees fairly well with the limits of volatile matter usually assigned in South Wales to these classes, which may be taken roughly as up to 8 per cent. for anthracite, 8 to 10 for semi-anthracite, 10 to 14 for dry steam coals ("quater-bituminous"), 14 to 20 for semi-bituminous, 20 to about 40 for bituminous, and over 40 for long-flame non-caking coals (lignitious).

Though, like Hilt's, it answers fairly well for the coals between anthracite and semi-bituminous, it fails egregiously in throwing all coals beyond 16·7 per cent. of volatile matter into one class. It also does not distinguish properly various classes of anthracite, such as the Red Vein anthracites of South Wales. A further defect lies in the fact that is based upon a conventional assay such as the volatile matter, which varies in value according to the method used. This objection applies also to Parr's recently proposed classification, based upon the ratio of the "volatile carbon" to the total carbon. This involves in addition the objectionable features of the idea of "fixed carbon," and is not improved by being complicated by the amount of actual carbon. Parr's classification avoids leaving the bituminous and lignitious coals without sub-division by introducing the idea of "inert volatile matter," which is only a disguise for the amount of oxygen. This brings us to the consideration of those classifications which are based upon the ultimate composition—that is, upon the amounts of carbon, hydrogen, or oxygen. These alone are founded on analytical data which are free from ambiguity. Of these the earliest is that of *Regnault*, who was the first to make accurate ultimate analyses of coal. He found that the chief well-defined commercial classes were contained between narrow limits of chemical composition, and showed that the amount of oxygen was a very characteristic property of each class. Gruner, the celebrated French metallurgist, extended Regnault's results, and gave limits for the chief classes. His classes are the same as Regnault's, and are still in the main the most suitable divisions which we can adopt, viz. :—

1. Anthracite.
2. Lean or anthracitic coals.
3. Short-flame bituminous coals.
4. True bituminous coals.
5. Long-flame bituminous coals.
6. Dry long-flame coals.
7. Lignite.

The chief defect of Regnault's and Gruner's classifications is the fact that the oxygen bears all the errors of analysis, and is therefore not a very good basis for classification. Another defect is that they do not sufficiently recognise the important part played by the hydrogen. This was first shown by Fleck (1866-1870), who introduced the idea of "disposable hydrogen," or hydrogen left after deducting that equivalent to the oxygen. Fleck used as a basis of classification the ratio of the disposable hydrogen to the carbon, $\frac{H}{C} \times 100$, as one factor, and the "combined hydrogen" (which depends really on the oxygen) as the other. He was the first to see that there was a close relation between the amount of hydrogen and the caking power, but unfortunately did not determine the volatile matter. In 1900 the present writer re-examined the whole subject, and found that Regnault's thesis was essentially correct—namely, that the typical classes of coal are confined within narrow limits of ultimate composition. The amount of *carbon*, however, was substituted for Regnault's and Fleck's oxygen. It was further found that for coals rich in carbon there was a close relation between the hydrogen and volatile matter, as well as the caking power. The outcome was a classification based upon both the hydrogen and the carbon, which in the main adopts the classes distinguished by Regnault and Gruner, but substitutes the percentage of carbon for that of oxygen, and the total hydrogen for the ratio of disposable hydrogen to the carbon used by Fleck. Below 84 per cent. of carbon the percentage of carbon alone was used as the chief basis of classification, these coals forming what was called the *lignitious* genus, corresponding to the dry long-flame coals of Regnault and Gruner, and sub-divided into species (according as the hydrogen was high or low), *e.g.*, the per-lignitious, lignitious and sub-lignitious coals. Above 84 per cent. of carbon the hydrogen was found to be the chief factor which determined the character of the coal, and five chief genera were distinguished as follows :—

	Hydrogen.	Approximate volatile matter.
Anthracitic genus.....	Up to 4 per cent.	Up to 10 per cent.
Carbonaceous genus....	4 to 4·5 ,,	10 to 16 ,,
Semi-bituminous genus	4·5 to 5·0 ,,	16 to 24 ,,
Bituminous genus.....	5·0 to 5·8 ,,	over 24 .
Per-bituminous genus	5·8 and over	

These values for hydrogen were found to agree, generally speaking, with the limits of volatile matter above, but the volatile matter may vary to some extent, and no stress is laid upon it for purposes of classification.

The typical coals of each genus were found to lie between narrow limits of carbon, and therefore these genera were sub-divided according to the carbon.

Thus the true anthracites were found to have carbon over 93·3 per cent., and were called ortho-anthracites (from the Greek *orthos*, true, typical) while those with the same hydrogen but lower carbon were distinguished as pseudo-anthracites (*pseudes*, false, atypical). There is a real and commercial distinction between these in South Wales.

The typical *carbonaceous* coals include the celebrated Welsh smokeless steam coals for naval purposes, and have carbon between 91·2 and 93·3, but coals of the same genus (and with the same hydrogen) are occasionally found with more or less carbon, and are called semi-anthracitic or pseudo-carbonaceous according to their carbon.

The true *semi-bituminous* coals have a higher hydrogen, volatile matter and caking power, and include the nearly smokeless steam coals used for bunkers. They have the same carbon limits as the carbonaceous coals, but coals of the same genus but lower carbon are sometimes found which are called "sub-bituminous."

For most purposes it is sufficient, in the case of the carbonaceous and semi-bituminous coals, to specify the genus to which they belong according to the hydrogen, but if desired the species may also be indicated by the carbon. In the case of anthracites, however, the species as determined by the carbon is of considerable importance.

The *bituminous* coals have hydrogen 5 to about 5·8, and when the hydrogen exceeds this limit it is advisable to distinguish them as *per-bituminous*. The amount of carbon now becomes important, and we distinguish three classes according to their carbon, viz. :—

Meta-bituminous coals, carbon 91·2 to 89. These are uncommon in Britain outside South Wales, but are allied to the true bituminous coals, and are suitable usually for coking or smiths' purposes on account of their high yield of coke. They are usually best used in horizontal coke ovens with or without recovery of by-products. The No. 2 and No. 3 Rhondda and other well-known Welsh coke-coals belong to this species, and they correspond well to Gruner's short-flame bituminous coals. When the hydrogen exceeds 5·8 we get per-bituminous coals (per-meta-bituminous), which include a few of the Hartley steam coals.

The *ortho-bituminous* (or true bituminous coals of Gruner) have a lower carbon, 89 to 87. They include the celebrated Durham coke coals, some of the

more bituminous Welsh coke coals, and the similar American Connellsvile coals—all most frequently treated in the beehive oven. They are also suitable for gas making.

When the hydrogen exceeds 5·8 we get into the per-bituminous genus (per-ortho-bituminous), and this includes a few cannels or bastard cannels.

The *para-bituminous* coals, with again the same hydrogen, have a still lower carbon, 87 to 84 per cent. They correspond to the long-flame bituminous coals of Gruner. When the hydrogen approaches the upper limit (over about 5·5 per cent.) they form, as a rule, good steam coals of the flaming or North-country type, but are also suitable, with a hydrogen lower than this, for gasmaking. The per-bituminous genus here includes many long-flame steam coals, and with still more hydrogen pass into cannels.

Below 84 per cent. of carbon we get a genus of coal which is intermediate in properties between bituminous coal and true lignite, and we term it *lignitious*. The coals may be per-lignitious or sub-lignitious, according as the hydrogen exceeds 5·8 or falls below 5 per cent., and are further sub-divided into the meta-lignitious species (84—80 per cent. carbon), and ortho-lignitious (80—75 per cent. carbon). They correspond to Gruner's dry long-flame coals, suitable for steam-raising, with a few gas coals when the hydrogen is towards the lower limit.

To use this classification, it is only necessary to calculate the hydrogen and carbon after elimination of the ash and sulphur. If the carbon is above 84 per cent., the hydrogen will then at once tell us the genus to which the coal belongs, and the carbon its species, if we desire to discriminate further. If below 84 per cent., the carbon will tell us the genus, and the hydrogen will further classify it if necessary. When the species is determined we shall know at once the general characters of the coal, and shall be able to compare it with other members of which the behaviour is known in practice. Many such examples will be found in these pages. A general synopsis of the classification is appended. It is only to be remarked that the full designation of the species is rarely necessary. Thus, it usually suffices to know whether a coal is a true anthracite or a pseudo-anthracite, without its being necessary to enquire if the species be sub-carbonaceous, sub-meta-bituminous, &c. The full designation of each species is, however, given for the sake of completeness.

Recently, Campbell, of the United States Geological Survey, has proposed to classify coals by the ratio of the carbon to the hydrogen $\frac{C}{H}$. This basis is in principle not different from the *hydrogen expressed as a percentage of the carbon*, $\frac{H}{C} \times 100$, instead of as a percentage of the pure coal. It is identical with

Fleck's factor, substituting the total hydrogen for the disposable hydrogen. Such a basis would answer very well to distinguish the genera above 84 per cent. of carbon and would not be inconsistent with the classification above suggested, except that there would be a slight overlapping at the border lines of the genera. It is, however, questionable whether it offers any advantage over the percentage of hydrogen alone. Below 84 per cent. of carbon there is no doubt that it is inadequate and that classification by the carbon alone is the most important basis. It is, however, a great advance upon the ordinary American practice and by no means irreconcilable with the classification above suggested. As regards the analyses of coke little need be said except to utter a warning against the use of the term "fixed carbon" or even "carbon" obtained by difference. This always contains nitrogen, oxygen, and even hydrogen. It is true that in some cases these do not together amount to more than about ·6 per cent., as in the one complete analysis of coke given in this collection; but this is by no means always the case. Indeed, the nitrogen alone is rarely under ·5 per cent. and may rise to over 2 per cent. In some cokes analysed by Muck the hydrogen was as much as 2 per cent. and the oxygen and nitrogen rose to over 7 per cent.

For ordinary purposes no doubt the amount of impurities is of more importance than the composition of the carbonaceous residue, but it is well to bear in mind that this is by no means pure carbon.

To make the fullest use of the *Colliery Guardian* collection of analyses the reader should select those which interest him (if complete data are given) and recalculate the results after elimination of moisture, ash and sulphur. By referring to the accompanying table of classification he will then be able to assign them to their proper genus and species, the characters of which have been already briefly indicated, and will be able to amplify this description in many cases from his own personal experience.

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SEYLER'S CLASSIFICATION OF COAL.

Carbon.	Anthracitic.	Carbonaceous.	Bituminous.			Lignitious.	
			Meta-	Ortho-	Para-	Meta-	Ortho-
	Carbon over 93·3 per cent.	93·3—91·2	91·2—89·0	89·0—87·0	87·0—84·0	84—80	80—75
PER-BITUMINOUS GENUS Hydrogen over 5·8 per cent.	—	—	PER-BITUMINOUS (Per-meta-bit.)	PER-BITUMINOUS (Per-ortho-bit.)	PER-BITUMINOUS (Per-para-bit.)	PER-LIGNITIOUS	
BITUMINOUS GENUS Hydrogen 5·0—5·8 per cent.	—	(Pseudo-bituminous species)	META-BITUMINOUS	ORTHO-BITUMINOUS	PARA-BITUMINOUS	LIGNITIOUS (Meta-)	(Ortho-)
SEMI-BITUMINOUS GENUS Hydrogen 4·5—5·0 per cent.	—	SEMI-BITUMINOUS SPECIES (Ortho-semi-bituminous)	SUB-BITUMINOUS (Sub-meta-bit.)	SUB-BITUMINOUS (Sub-ortho-bit.)	SUB-BITUMINOUS (Sub-para-bit.)	SUB-LIGNITIOUS (Meta-)	(Ortho-)
CARBONACEOUS GENUS Hydrogen 4·0—4·5 per cent.	Semi-anthracitic species	CARBONACEOUS SPECIES (Ortho-carbonaceous)	PSEUDO-CARBONACEOUS (Sub-meta-bit.)	PSEUDO-CARBONACEOUS (Sub-ortho-bit.)	PSEUDO-CARBONACEOUS (Sub-para-bit.)		
ANTHRACITIC GENUS Hydrogen under 4 per cent.	ORTHO-ANTHRACITE	PSEUDO-ANTHRACITE (Sub-carbonaceous)	PSEUDO-ANTHRACITE (Sub-meta-bituminous)	PSEUDO-ANTHRACITE (Sub-ortho-bituminous)	PSEUDO-ANTHRACITE (Sub-para-bituminous)		

N.B.—The various genera are arranged in column I. vertically according to the hydrogen. The species in each genus are arranged horizontally according to the carbon.

CHARACTERISTICS of the CHIEF COAL SEAMS worked in the BRITISH ISLES.

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CHARACTERISTICS of the CHIEF COAL SEAMS WORKED in the BRITISH ISLES.

ALTHOUGH plentiful information is available with regard to the structure of the coalfields of this country and the number and thickness of the seams, as well as their depth below the surface, it is often very difficult to obtain any details of their quality and commercial value. For some reason, not easy to understand, this point of view is almost totally ignored in coalfield literature, notwithstanding the fact that it is one of the first things which the users of coal require to know.

An endeavour has been made in the following pages to summarise, as briefly as possible, the available and extremely scattered information upon the characters of our principal coalseams. The result is admittedly imperfect; but it is hoped that it will at least serve the purpose of stimulating those conversant with the local characters of our coals to send us fuller information to incorporate in subsequent editions. The arrangement of the subject follows the inspection districts, with one exception. The following order has been observed :—

1. The Scotch coalfields.
2. The coalfields of England and North Wales.
3. The South Wales coalfield.
4. The Irish coalfields.

THE SCOTCH COALFIELDS.

DUMFRIESSHIRE.

In the Canonbie coalfield there are several workable seams of bituminous coals.

Sanquhar coalfield has the CALMSTONE coal of good household quality, resembling the Ell coal of Lanarkshire, also Splint coal not unlike that of Lanarkshire both in quality and appearance.

AYRSHIRE.

Muirkirk district has coals very suitable for smelting iron ores. The most profitable seams are the THREE-FOOT coal at Glenbuck, and the NINE-FOOT coal at Glenbuck and Muirkurk, which contain bands of rich cannel. The SIX-FOOT or CATCHYBURN seam has occasional gas coal at Glenbuck, where a seam of very rich Boghead gas coal, 7 in. thick, has been worked. At Gass Water, Guelt and New Cumnock the coal is very hard and splinty. In the neighbourhood of Dalry the WEE coalseam is sometimes a gas coal.

The Girvan coalfield has generally coarse coals with rather high ash, useful for local purposes. The MAIN and ELL coalseams are the best in quality.

New Cumnock district is noted for its cannel, associated with a lustrous black coal, with a brown streak, forming good gas coal, and also a soft, black coal of very high quality for household purposes. The THREE-FOOT coal makes an excellent coke. The FOUR-FOOT and EIGHT-FOOT seams require careful screening.

In the Dalmellington coalfield the lower coals have coking properties not found in the upper seams.

The MAIN coal in the Cumnock and Lugar districts is a first-class house coal, known in the market as the "BUTE JEWEL" or the "BOSWELL JEWEL." The MAIN SPLINT coal of the same area is a good furnace coal.

The Ayr coalfield has both soft and splint coal (AYR HARD); the latter being the most valuable seam. In the Kilmarnock and Galston district the TOURHALL coal is a good house coal. Other seams are hard and splinty, and suitable for furnace coal. The MAIN coal is the best house coal in this district.

In the Saltcoats and Kilwinning coalfields is found the blind coal of Caprington, which has long been in use for smelting, but is now nearly exhausted.

RENFREWSHIRE.

The HURLET coal lies deep, and is still almost intact.

LANARKSHIRE.

The UPPER coalseam at Govan and Stonelaw is an excellent house coal.

The ELL coal is of exceptional quality, much in demand for household use; but in the Airdrie district this seam becomes hard and splinty, and more suitable for furnace and manufacturing use.

The PYOTSHAW coal between Cambuslang and Hamilton is hard and splinty, and suitable for furnace and manufacturing purposes. The MAIN coal, often only separated by a thin parting from the Pyotshaw seam, is a bright, black coal used as a second-class house coal, and for manufacturing and locomotive

purposes. It has ribs of splint coal, and sometimes one of cannel of fair quality. It is liable to contain "pugs" of bastard gas coal, which are sometimes picked out and sold separately for gasmaking purposes. These yield good gas, but the coke is soft and of little value. Sometimes the Splint coal is separated by hand-picking and sold as steam coal.

The HUMPH coal is a useful smithy coal.

The SPLINT coal is suitable for iron smelting and gasmaking. There is usually a layer of cannel associated with it. The VIRGIN coal often affords a house coal of good quality. The MUSSEL-BAND coal is largely used for gas-making. The seams above the Virgin coal form the Upper seams.

The Lower seams of Lanarkshire include the VIRTUEWELL coal, a bright black coal coarser than the Ell seam, but making good house coal; it corresponds with the Johnstone coal of Slamannan.

The KILTONGUE coal is often hard and splinty, and of second-class quality, but in the Coatbridge district is largely used for gasmaking purposes; it makes good coke and sometimes has at the top a band of cannel, one of the richest in the country.

The UPPER DRUMGRAY coal is a hard, blue-black coal suitable for furnaces in the Clyde basin, but in the Slamannan district it is a first-class steam coal, known as COXROAD coal. The LOWER DRUMGRAY coal is generally softer, and of better quality for household purposes. Beneath the Drumgray coals of the Clyde basin are several seams of moderate quality, amongst which the MILL coal, BALL coal and MAIN coal are worked in the Shotts and Benhar district. Owing to the influence of whinstone dykes in several places, these coals have become good steam coal and even anthracite; but in other parts the coals have been so burnt as to be useless.

In the Douglas and Lesmahagow coalfield, the best seams are the SEVEN-FOOT and NINE-FOOT seams, now almost exhausted. The quality resembles the best Lanarkshire Ell coals. In the Coalburn district, although the coals are generally somewhat inferior, their commercial value is largely increased by bands of gas coal. The common qualities are used for locomotive purposes, and some are sold for general steam-raising and bunker purposes. The NINE-FOOT and SEVEN-FOOT seams are chiefly sold as gas coals, and contain bands of cannel of high quality. These are not generally separated, the whole seam being dealt with collectively. The famous Lesmahagow gas coals were thin seams of cannel mined near Auchenheath. The BIG DRUM coal in the Ponfeigh district is of similar character to that of Coalburn. It is largely used for locomotive and manufacturing purposes. Nearly every seam contains bands of good cannel. A gas-coal seam has been extensively worked at Haywood, Wilsontown, and

Climpy Collieries, the quality being not far below the Main Lesmahagow cannel. In the Carluke district the Lesmahagow gas coal is thin, but has been worked to some extent.

DUMBARTONSHIRE.

In the Kirkintilloch and Kilsyth districts the seams are very variable in thickness, much faulted and often greatly burnt by whinstone intrusions. Yet the seams are often of considerable value, coking well to a coke of very high quality. At Kilsyth the "HOUSE COAL" is a very good household coal, with fine coking qualities. Other seams afford good smithy and coking coals. The HURLET coal in the Campsie district contains much pyrites, which is separated and sold to chemical manufacturers.

STIRLINGSHIRE.

The Slamannan coalfield produces a steam coal of very high quality, and at Eastfield, in the Longriggend district, the Coxroad seam has been burnt by whin dykes to a hard anthracite. The SPLINT coal of Lochend is of similar character, and is worked as an anthracite, practically smokeless, and with nearly 80 per cent. of carbon. In the Bannockburn district the GREENYARD coalseam, known commercially as the Bannockburn Hartley steam coal, is a first-class coal for steam-raising, as well as for household purposes. The MAIN coalseam (known in commerce as the Bannockburn Wallsend drawing-room coal) is an exceptionally good house coal. This coal also makes a good foundry coke.

The seams at Denny have been slightly burnt to a smithy coal of high quality.

LINLITHGOWSHIRE.

The Bo'ness coalfield has the SPLINT coal, CORBIEHALL coal, SEVEN-FOOT coal, a fairly good steam coal, the WESTERMAIN coalseam, now almost worked out, the RED coal, of fair quality, and the CRAW coal, a fairly good house and steam coal; in some places the best part of the seam is cannel. The SIX-FOOT coal is of good quality, but often split up by dirt bands. The EASTER MAIN coal, now almost worked out, is of very high quality, with no dirt bands or pyrites. The SMITHY coal is better than its name implies, and is really a good coking coal. All the Bo'ness seams deteriorate, both in quality and thickness, as they approach the volcanic area southwards at Linlithgow.

At Balbardie, near Bathgate, is the BALBARDIE gas coal seam, a cannel of high value, but thin. The LADY MORTON coal seam and the WOODMUIR MAIN coalseam are of fairly good quality for house and steam purposes.

In the carboniferous limestone series, the PARROT coal seam and the MAIN coal seam, have been worked, but are much mixed with dirt bands.

The Armadale district has several second-class seams, which have been much worked on account of the presence here of the famous Torbanehill cannel coal. The MILL coal is the best and makes a second-class house coal, and a fair steam coal. The BALL coal is used locally in the oilworks. The COLINBURN coal is of somewhat similar character to the Mill Hill seam.

MID AND EAST LOTHIAN COALFIELDS.

The GREAT seam coal is generally sold as a steam coal. The DIAMOND coal is a very good house coal, while the SPLINT coal is a first-class steam coal. The JEWEL coal is a fairly good house and steam coal. The seams become impoverished towards the south.

In the Niddrie district the SOUTH PARROT seam consists of splint coal (18 in.) and cannel (12 in.). The GREAT seam at Niddrie is valued largely on account of the Parrot (cannel) coal in the upper part of the seam. The STAIRHEAD cannel and the EDMONDSTONE cannel are also worked in this area. The CARLTON coal is an excellent house coal, as also is the NORTH GREENS coal, which contains a thin seam of cannel.

In the eastern side of the coalfield the best seam is the CARBERRY JEWEL coal, an excellent household coal. The GARIBALDI seam is a good steam coal.

The PEACOCK, CORBIE SPLINT and NORTH coals of the Loanhead district are good household coals. The GREAT seam here has no cannel, and is an excellent steam coal.

The ARNISTON DUNDAS coal is a very good house coal, clean, and with very little sulphur or ash. The Splint seam in this area is also an excellent house coal. The ARNISTON PARROT or JEWEL seam is a superior house coal in its upper part, high quality cannel in the centre, and second-class house coal below. The cannel is superior to that of Lesmahagow.

HADDINGTONSHIRE.

In the Haddingtonshire coalfield the chief seams are the GREAT seam, a fairly good house and steam coal, containing no cannel; SPLINT coal, good house coal; PARROT seam, containing steam coal, cannel and house coal; THREE-FOOT seam; FOUR-FOOT seam; FIVE-FOOT seam; PENSTONE TRYSING or PANWOOD seam, all yielding good steam or second-class house coals.

CLACKMANNAN.

In the Alloa coalfield the chief workings are in the UPPER FIVE-FOOT seam, nearly exhausted. The NINE-FOOT seam, consisting of Splint coal, with a seam of Parrot coal at the top, is largely worked out. CHERRY or LOWER FIVE-FOOT seam is an excellent house coal at bottom, steam coal at top, and is known commercially as ALLOA JEWEL coal. The SPLINT coal is a good quality steam coal.

FIFESHIRE.

The Dunfermline coalfield contains the following seams in the carboniferous limestone formation :—

BRIGHT coal seam, splinty coal, not much worked ; SIX-FOOT coalseam, steam or manufacturing coal; CAIRNCUBIE seam, second-class quality ; SWALLOWDRUM, very moderate quality ; UPPER EIGHT-FOOT seam, not high-class quality, but used largely for manufacturing purposes; LOWER EIGHT-FOOT seam is better in quality and makes a fairly good steam coal ; FIVE-FOOT coal, a good, bright, black steam coal, but only second-class house coal ; DUNFERMLINE SPLINT coal, always good quality, either as house coal on the east or first-class steam coal on the western side of the basin. Locally it is converted into " blind coal " or coarse anthracite by proximity of whinstone.

In the Blairadam and Kelty coalfield the SPLINT coal is better than at Dunfermline, and furnishes an ideal coal for household or steam-raising purposes. It forms the AITKEN WALLSEND house coal of commerce. The FIVE-FOOT seam known as AITKEN HARTLEY coal, when mined with the Wallsend variety in equal proportions, is known commercially as the AITKEN NAVIGATION coal. In this district the SWALLOWDRUM coal of Dunfermline is represented by the BANK coal or LOCHGELLY SPLINT, which here becomes a fairly good house and steam coal. The CAIRNCUBIE seam also appears at Lassodie as a first-class house coal. The JERSEY coal, possibly representing the BRIGHT coal, is a soft house coal at Lassodie. The MAIN coal of Kelty is worked for steam and bunker purposes.

WEST FIFE.

Near Oakley, the BLAIRHALL main coal is a good clean coal used largely for gas making. At Kinedder the SPLINT coal is fairly good household coal, and the FIVE-FEET seam is a steam coal. The TOP coal at the Steelend pits is very good steam coal, and is also used for smithy purposes. The Lower seam contains Parrot coal (cannel) and is suitable for gas making.

THE LOCHGELLY COALFIELD.

Lower seams as in the Dunfermline district. The upper seams contain the LITTLE SPLINT, FOURTEEN-FOOT and DUDDY DAVIE, used mostly for second-class steam coals. The Lochore Parrot coals somewhat resemble the Boghead cannel, giving rather less yield of gas, but producing coke of a quality suitable for firing gas retorts and similar purposes.

KIRKCALDY COALFIELD.

The LOCHGELLY SPLINT coal is the best seam and is used as a first quality household and steam coal. The PARROT coal at Dundonald is a SPLINT coal, but farther east becomes a second-class gas coal. The GLASSIE and MYNHEER coals have been burnt by intrusive whins and converted into steam and smithy coals of fair quality. The Dunfermline Five-foot and Splint seams thin out here and are not workable.

EAST FIFESHIRE.

The Lochty coalfield is scarcely worked.

The Largo, Largoward and Raderine coalfield contains the LARGOWARD Splint coal, which is of good quality.

The coal-measure coals are worked in the Leven and Dysart coalfield and in the Kinglassie coalfield. In the former the seams chiefly worked are the BARNCRAIG coal, chiefly used as a steam coal, but sometimes as household coal; COXTOOL coal is a steam coal; CHEMISS seam has an upper part of good house coal and a lower part of steam coal; EARL'S PARROT seam is a fairly good gas coal, and yields cannel at Leven; DYSART MAIN coal has been very largely worked. As it approaches the east, beneath the sea, it becomes more anthracitic, and is much used by brewers.

In the Kinglassie coalfield similar seams occur, but only two of them have yet been worked and only to a small extent.

THE COALFIELDS OF ENGLAND AND NORTH WALES.

NORTHUMBERLAND AND DURHAM COALFIELD.

The following are the chief seams occurring in this coalfield in descending order :—

The HIGH MAIN seam of the Tyne collieries is of a rich and caking quality, burning rather quickly, making a hot fire and leaving but little ash. At Seaton Delaval and Hartley, however, it loses richness, burns openly leaving a white ash and makes a pretty good steam coal. This seam furnishes the original Wallsend coal, and was at its best between the Tyne and the Ninety-Fathom Dyke. It is now almost exhausted.

The FIVE-QUARTER seam of the Wear and Tees districts forms together the GREY seam, and furnished the coal known as Tees Wallsend. Near Newcastle this makes two seams, the METAL coal and STOVE coal. The coal from the Grey seam is rich and caking, rather harder than the HIGH MAIN, but leaving more ash. In places it becomes less bituminous and associated with splint coal it then makes a good steam coal, as near Durham.

The YARD coal of the Hartley district is an excellent steam coal. South of the Tyne it produces coals varying from first to second household quality, harder than the High Main seam of the Tyne. In the eastern parts of Durham it forms the WEAR MAIN coal, a strong coal, but somewhat inferior in quality.

The BENSHAM seam of the Tyne, known as the MAUDLIN seam in the Wear district produces coals of rather tender description, interstratified with splint, and inferior in quality as house coal, but has been much used for gas manufacture; its quality improves towards the east. Towards the south, at Hetton it becomes a strong steam coal, and nearer Durham improves greatly in quality. At Tanfield, although tender, its freedom from sulphur causes it to be in demand for metallurgical use.

The LOW MAIN seam of the Tyne, known as the HUTTON seam of the Wear, is also variable in quality. At Hartley and West Cramlington it is a first-class steam coal, working large, burning quickly, leaving a white ash, but no clinker. In places, as at Felling, it is more tender, being much in request as a gas coal. The small coal is much used as a smithy coal, and is free from pyrites. At Haswell, the bottom part is worked as a steam coal, the upper part being a first-rate household coal. This seam is the most valuable in the district, yielding the Cramlington and Hartley steam coals north of the Tyne; the Felling, Peareth and Pelton gas coals between the Tyne and Wear; and the Lambton's, Stewart's, Hetton and Haswell Wallsend house coals beneath the

magnesian limestone area. It is not so hard, and does not bear carriage so well as the Five Quarter seam, but is superior in quality.

The PLESSY seam makes an excellent steam coal in the Blyth Valley.

The BEAUMONT seam of the Tyne is called also HARVEY'S LOW MAIN, the TOWNELEY, ENGINE and BARLOWFIELD seam, and in the Auckland and Etherley district the YARD coalseam. At Towneley it is a good gas coal, having a seam of cannel at the top. In the Tyne area it produces a uniformly good second-class household coal. It is a good gas coal, and makes good coke.

The LOWER FIVE-QUARTER seam at Towneley produces rather tender coals, not very good for export, but making good manufacturing and smithy coal. It makes excellent coke.

The THREE-QUARTER seam has not proved largely workable.

The BUSTY seam in the Brancepeth district furnishes good blast-furnace coke.

The BROCKWELL seam is generally rather tender, but of good quality and cokes well. As a household coal it is generally second rate. Its important properties are its cheapness of working and superiority of its coke.

Of the coals in the Northumberland and Durham coalfield generally, Mr. G. C. Greenwell says that the variation in quality in different areas often affects all the seams. Thus, in the Cramlington district all the seams are very hard, free, and open burning, with a white ash, and suitable for steam purposes. In the Heworth district the same coals are friable and tender, adapted for gas manufacture, but not so suitable for steam purposes; in the Tanfield and Crook districts there is still less hardness, but greater purity, and consequently better adaptation for manufacturing and coking purposes. In the Hetton and Blackboy districts the same seams afford coal of the finest household quality, and almost as hard as in the Cramlington area.

A thin band of cannel coal was formerly worked in some districts, as at Wallsend Pelton Main and Washing Colliery, and Ramsey's Colliery, Newcastle-on-Tyne.

The Bernician Coals of Northumberland, as worked in the Berwick and Haltwhistle districts, include the FELLTOP LIMESTONE coal, OAKWOOD coal, LITTLE LIMESTONE coal, known as ACOMB seam, BLENKINSOPP coal, HALTWHISTLE coal, CLAREWOOD, INGHOE, BOGHALL, and CAMBO seams.

SHILBOTTLE seam, said to be the best in the series, very hard and durable, and leaving a heavy dark-brown ash.

COWDEN coal.

REDESDALE coals, comprising STIDDLE HILL coal, UPPER HALL seam, BELLINGHAM coals, ELSDON seam, &c.

PLASHETTS coals, excellent quality for landsale purposes, comprising the BLACKHILL seam, SCREMERSTON MAIN or the CRAW coal, and the HARDY or KILN coal. These coals are often very hard and lumpy.

CUMBERLAND COALFIELD.

The principal seams worked in this district are the BANNOCKBAND, at Whitehaven and Workington, and supposed to be represented by the TEN-QUARTER seam of Maryport. Below this is the MAIN BAND of Whitehaven and Workington, which consists over part of the district of two beds, the METAL BAND and CANNEL BAND. Lower still is the LOW BOTTOM seam of Whitehaven, forming the SIX-QUARTER seam of other districts. Mr. T. P. Martin gave the following account of the seams of this coalfield in his evidence before the Royal Commission. The seams are in descending order, but are not all present in each of the three districts of Whitehaven, Workington and Maryport :—

SENHOUSE seam, house, steam and coking coal; HAMILTON seam, steam coal; VIRGIN seam, house, steam and coking coal; WHITE METAL seam, steam coal; TEN-QUARTER seam, house, steam and coking coal over a small part of the district, the bottom coal is of inferior quality: RATTLER seam, house, steam and coking coal; CROW seam, steam coal, usually of inferior quality and unworkable over great part of the district. To the extreme east it is the only member of the MAIN BAND group existing, and has been worked to a considerable extent; MAIN, METAL BAND AND CANNEL BAND, house, steam and coking coal. Over part of the field the seam is divided into two beds. To the east the strata between the two beds increase in thickness; the seam itself is also much split up with beds of shale, and is unworkable. YARD seam, house, coal and coking coal. Over the central portion of the field this seam is thin and of inferior quality. To the north-east it increases in thickness, and the Upper or Main coal improves very much in quality. The section in that district is as follows:—Coal 3 ft. 9 in., shale 2 in., coal 7 in., total 4 ft. 6 in. Over part of this area the bottom is of inferior quality. LITTLE MAIN seam, house, gas and coking coal; SIX-QUARTER, house, steam, coking and over a small part of the field, gas coal. The thickness of the coal varies very much. and also the number and thickness of the bands of shale it contains; THREE-QUARTER seam, house, steam and coking coal; FOUR-FOOT seam, steam coal; UDALE seam, inferior steam coal.

YORKSHIRE COALFIELD.

Nearly every class of coal occurs in Yorkshire, including house coal, gas coal, hard steam coal, engine coal and coking coal. Speaking generally, the

West Yorkshire coals do not coke so well as in South Yorkshire, and some of the seams in the West Riding will not coke at all. In South Yorkshire the BARNSLEY or TOP HARD seam is most worked. This is at its best between Treeton and Royston and South Kirkby. Here the middle portion is steam coal, and the upper and lower parts are bituminous. In a southerly direction it loses the bituminous constituents and becomes throughout a non-coking steam coal. The PARKGATE seam is a high-class gas coal, but becomes a second-rate steam coal towards the north. The SWALLOW WOOD seam becomes a high-class house and gas coal in West Yorkshire. Although the seams generally vary in character in different parts of the district, some retain great uniformity over large areas. Thus the PARKGATE seam of South Yorkshire, which is the same as the DEEP HARD of North Derbyshire, and the SILKSTONE of South Yorkshire, or the BLACK SHALE coal of Derbyshire, retain their character over a large area, being a soft bituminous coal of great purity, excellent house and coking coal. These are probably the same as the ARLEY MINE seam of Lancashire.

There is a general correspondence between the coal measures of South and West Yorkshire. Thus in each coalfield, besides many minor seams, there are three chief workable seams and two other important beds of somewhat inferior quality. These are:—

In West Yorkshire, STANLEY MAIN seam, HAIGH MOOR seam, MIDDLETON MAIN seam, WARREN HOUSE seam, BEESTON coal.

In South Yorkshire, the BARNSLEY seam, PARKGATE seam, SILKSTONE seam, SWALLOW WOOD seam, THORNCLIFFE THIN seam.

In West Yorkshire, in descending order, the first important seam is the STANLEY MAIN, which yields a large proportion of the West Yorkshire steam coal, exported at Goole and Hull; and is also sold as a second-class house coal. The SCALE coal, lying 20 yards above it, is a good house coal, but not much worked.

The next important bed is the WARREN HOUSE seam, which yields only a second-class steam coal. This seam is known as GAWTHORPE coal in the Ossett district, where it is worked as an engine coal. The WARREN HOUSE seam is supposed to be the same as the BARNSLEY seam of the south.

The HAIGH MOOR seam is a first-class house coal, much worked about Castleford and Pontefract.

The JOAN or MITCHELL coal, FLOCKTON THICK and FLOCKTON THIN seams thin out east of Leeds, but are much worked to the west. The FLOCKTON THICK contains some good cannel at Morley and Batley. FLOCKTON THIN, called also ADWALTON BLACK BED, is a good house coal.

The MIDDLETON LITTLE coal, worked about Morley, is a good hard steam coal.

The MIDDLETON MAIN, or so-called Silkstone of West Yorkshire, is the most valuable seam of the district, and is a good house and gas coal.

WHEATLEY LIME coal is of poor quality and only used locally.

BLOCKING coal is a persistent seam, generally of good quality. This seam is believed to represent the Silkstone seam in South Yorkshire.

BEESTON BED is fair house coal.

LOW MOOR BLACK BED is a good class gas coal; rather soft, friable, and dull looking; burns to a red ash, much used as engine coal.

LOW MOOR BETTER BED, a very pure coal, but too thin to be of any but local value. Its freedom from sulphur renders this coal of excellent quality for iron smelting.

HALIFAX HARD BED, of poor quality.

HALIFAX SOFT BED, good coal, making first quality coke.

In South Yorkshire, taking the seams in descending order, the SHAFTON coal and the upper seams at Sharlston have been worked locally, but for various reasons have not yet been considered of much commercial value.

KENTS' THIN and KENTS' THICK seams, known also as BEAMSHAW coal and MAPPLEWELL coal, are of inferior quality. These overlie the

BARNSLEY BED, the best known seam in Yorkshire. This bed has also been designated the TOP HARD, ELSECAR and GAWTHORPE coal. This seam derives its value from the fact that in its middle part it is semi-anthracitic consisting of alternating layers of dull and bright coal, forming the BARNSLEY HARD steam coal, used both for locomotive and smelting purposes. The upper and lower portions of the same seam, which is altogether nearly three yards in thickness, are soft bituminous house coals.

SWALLOW WOOD coal is probably on the same horizon as the HAIGH MOOR seam in West Yorkshire. It is of variable quality, sometimes very good and at other times of little value.

LIDGET coal is a household coal used locally, and of little general value.

FENTON coal is not much worked.

PARKGATE seam is of good quality and ranks next to Barnsley and Silkstone in value in South Yorkshire. Around Sheffield it is a furnace coal, and near Rotherham part of it is a first-class gas coal.

THORNCLIFFE THIN coal is much worked as a steam and furnace coal. In the Barnsley district it is also used for household purposes.

SILKSTONE seam is worked continuously from Cawthorn on the north, through Derbyshire to Nottingham on the south. At its best it is a very pure bituminous household coal. It it sometimes rather tender, and then makes a

first-class gas and coking coal. The Silkstone brights gas coal is a lustrous black coal, with irregular transverse fracture and free from pyrites, swelling up and caking when burnt, and leaving a reddish grey ash. The SILKSTONE HARDS is a stronger coal of very similar character.

LANCASHIRE.

The WIGAN seams include the following:—FOUR-FOOT coal, making good gas coal; INCE YARD coal; INCE FOUR-FOOT coal; INCE SEVEN-FOOT coal; FURNACE MINE; PEMBERTON FIVE-FOOT MINE, hard, free-burning steam coal; PEMBERTON FOUR-FOOT MINE, a bright coal, free from pyrites; WIGAN FIVE-FOOT (inferior); CANNEL, best gas coal; KING coal; YARD coal; BONE coal; SMITH coal; ARLEY MINE, next in value to the Cannel seam—a semi-bituminous, free-burning steam, house and gas coal, leaving considerable ash but no clinker. The Wigan SIX-FEET seam at Bamfurlong gives steam, gas, house and manufacturing sorts. New seams known as RAMS seam and TRENCHERBONE seam are worked; the latter is used as gas, steam, manufacturing and household coal.

St. Helens district has beneath several beds of inferior DELF coals; ST. HELENS MAIN coal; FOUR-FEET coal; CANNEL; RAVENHEAD MAIN coal; BASTIONS MINE; RUSHY PARK coal, for steam and furnace purposes; LITTLE DELF or ARLEY MINE, more bituminous than the above, softer and less bright, used chiefly for smithy purposes and for coking; the HAYDOCK HIGHER FLORIDA coals, clean and durable, and largely used on ocean steamers, as well as at the Cheshire Saltworks; the FLORIDA MAIN seam—(N.B.—These two seem to be the ST. HELENS MAIN coal and the FOUR-FEET seam respectively.) The LITTLE DELF of St. Helens is the ARLEY MAIN of Wigan, the RILEY MINE of Bolton, the DOGSHAW MINE of Bury, and the FULLEDGE MAIN coal of Barnsley. This is the lowest coalseam of the Middle coal measures, and is of great economic value.

The Burnley coalfield has the following seams:—DOGHOLE coal, KERSHAW coal, SHELL coal, MAIN coal, MAIDEN coal, LOWER YARD or FIVE-FOOT coal; LOWER BOTTOM OR FOUR-FOOT coal, impure cannel, THIN coal, GREAT MINE, CHINA BED, DAUCHY BED, FULLEDGE MAIN coal or ARLEY MINE.

In the Lower coal measures bordering the coalfield are the "Mountain Mine" seams, including UPPER MOUNTAIN MINE steam coal, LOWER MOUNTAIN MINE steam and coking coal, soft and slow burning.

CHESHIRE.

Six to ten seams of good thickness and quality, the lowest of which is the REDACRE MINE, identical with the famous ARLEY or ROYLEY Mine of South

Lancashire. At Bredbury, near Stockport, the seams include the FIVE-FEET seam (gas coal), BLACK MINE, STONE MINE, PEACOCK or KING WILLIAM coal, SILVER MINE.

At Poynton, near the centre of the field, there are manufacturing coals, gas coals and house coals; the chief seams are MILL MINE, SHEEPWASH MINE, GREAT MINE, FOUR-FEET MINE, SILVER MINE, NEW MINE, and REDACRE MINE (representing the Arley Mine of Lancashire). A cannel coal seam occurs at Dukinfield.

NORTH WALES COALFIELD.

The Denbighshire coalfield contains the following seams: — TOP SULPHUROUS coal, BOTTOM SULPHUROUS coal (not worked); SMITH'S coal; DROWSALL coal, a good quality house coal; POWELL coal (representing the Bind coal of Flint); TWO-YARD coal (representing the Hollin coal of Flint), furnace and steam coal; CRANK coal, worked at Wrexham; BRASSEY coal; MAIN coal—employed as furnace and steam coal: some of the seams in this area are esteemed for household use. The Main coal at Ruabon is a black, laminated bituminous coal, caking on burning and leaving a pale yellow ash.

The FLINTSHIRE coalfield contains the following seams:—FOUR-FOOT coal (cannel); BIND coal; HOLLIN coal, gas coal; CANNEL gas coal; BRASSEY coal; MAIN coal; LOWER FOUR-FOOT coal (in some places cannel), gas coal.

In Flintshire, gas coals are got from HOLLIN coal, CANNEL and LOWER FOUR-FOOT seam of Mold. The LEESWOOD CANNEL, Mold, is said to rival the Wigan cannel. The gas coals are limited in area. Thus the HOLLIN coal, which is a gas coal at Mold in Flintshire, becomes the TWO-YARD coal of Denbigh, where it is used chiefly for steam purposes.

The BAGILLT MAIN seam is used as steam coal, lighting easily and burning freely, but giving off much smoke and soot, with considerable ash and cinder, with little clinker.

NORTH STAFFORDSHIRE COALFIELD.

There are some good gas and coking coals, but the greater part are dry bituminous coals suitable for household and manufacturing purposes.

POTTERIES COALFIELD. The following are the chief seams in the lower part of the Potteries Coalfield:—

LOWER DIVISION, EASTERN AREA:—MON coal is best household coal in Longton district, at Fenton it has a 3 ft. seam of cannel above it; LITTLE ROW coal is a good house coal; YARD coal is sold for household and potters' use, and also cokes well; BIRCHES or OLD WHITFIELD coal is a blast-furnace, steam and manufacturing coal, also used for household purposes; BELLRINGER or STONY

EIGHT-FEET coal is a blast-furnace coal; TEN-FEET coal is a steam, forge and manufacturing coal, also second-class house coal; BOWLING ALLEY coal is good manufacturing and house coal; HOLLY LANE coal is a good house coal; HARD MINE coal is mainly used for blast furnaces, also a first-class locomotive coal; SEVEN-FEET BAMBURY coal is a house coal, also used for manufacturing, forge and steam purposes; COCKSHEAD coal is a first-class house coal, also used for blast furnaces and general manufacturing; BULLHURST coal is house coal. A prominent feature is the almost total absence of gas and coking coals from the eastern area.

LOWER DIVISION, WESTERN AREA:—FOUR-FEET coal is house coal; SINGLE FIVE-FEET coal is house coal; RAGMAN coal is a steam coal; SEVEN-FEET coal is a house coal; HAMS coal is steam coal; TEN-FEET coal is house and gas coal; SEVEN-FEET BAMBURY coal is a house and gas coal, as are also the EIGHT-FEET and BULLHURST coal; FOUR-FEET or CRABTREE coal, smithy coal; WINPENNY coal is not worked here.

In the next division the following seams occur; they are of less value than those below:—NEW MINE coal, a manufacturing coal; GIN MINE and TWIST or POTTERY coal; BIRCHENWOOD coal, a first-class house coal in the Kidsgrove area.

In the higher division the following seams occur:—BASSEY MINE, not used; PEACOCK coal, LITTLE ROW coal, and SPENCROFT coal, used as potters' coal and in forges; GREAT ROW coal, used for house, steam, pottery and iron manufacture: it is overlain by cannel coal; CANNEL ROW coal, used for steam, pottery and second-class house coal. It has cannel coal above it. WINGHAY coal, used for manufacturing purposes; ASH coal, a good house coal, used also for manufacturing, steam and forge purposes.

In the neighbourhood of Goldendale the following seams are found (descending order):—LITTLE ROW coal, good house coal; YARD coal, not very good; RIDER coal, locomotive steam coal; FOUR-FEET coal, house coal; ROG MAN coal, good house coal; ROUGH SEVEN-FEET coal, good steam coal; SMITHY coal, used by blacksmiths, a good coal for welding; STONY EIGHT-FEET coal, very inferior; TEN-FEET coal, very inferior, manufacturing and steam coal; TWO-ROW (MAGPIE coal), good steam coal and second-class house coal; HOLLY LANE coal, very good house coal; BOWLING ALLEY coal, not very good; SEVEN-FEET BAMBURY, best house and best gas coal; EIGHT-FEET BAMBURY coal, seconds house and gas coal; BULLHURST coal, very good house and gas coal, even superior to Seven-Feet Bambury; WINPENNY coal, best house and gas coal; SILVER MINE coal, good coal.

In the northern part of the coalfield, in the Biddulph Valley, all the coals

are open burning, bituminous kinds. The HARD MINE or SPARROW BUTTS coal is here an excellent furnace and steam coal. The SEVEN-FOOT BAMBURY or Froggery coal is a steam coal; the EIGHT-FOOT BAMBURY or NEWPOOL coal is used for furnaces and for second quality house and steam coal. The BULLHURST seam has here too much sulphur for use in iron manufacture, and makes a second-class house and steam coal.

In the Audley-Harecastle district the ROUGH SEVEN-FEET coal and STONY EIGHT-FEET coal are steam coals of average quality. The TEN-FEET coal is a highly bituminous coking coal and Two-Row coal is an open-burning house coal.

The SEVEN-FEET BAMBURY is a highly bituminous coking coal, making the best house and gas coal in the district. The EIGHT-FEET BAMBURY coal makes a steam and seconds house coal, and at Talk-o'-th'-Hill a highly bituminous coking coal. The BULLHURST coal is generally a best house and gas coal in the middle part, the top and bottom being inferior. The best part is highly a bituminous coking coal.

SOUTH STAFFORDSHIRE.

The TWO-FOOT coal is bituminous, and suitable for household and manufacturing purposes.

The BROOCH coal is also a bituminous household coal. It makes good coke, suitable for melting purposes, being very free from sulphur. The FLYING REED coal makes an inferior house coal, but a good forge coal. The THICK coal is a bituminous coal, the top part being the best and strongest. This is used for blast furnaces, and also household purposes. The lower part is mostly used for mill and forge purposes, but is occasionally coked. The HEATHEN coal is a bituminous coal used for furnace and second quality house coal. It has also been used for gas-making. The NEW MINE coal is a bituminous coal used for blast furnaces, mill and forge work, tube furnaces, and for coking. The BOTTOM coal is a soft coal only used for forge purposes, and a similar use is found for the BOTTOM COAL HOLERS and the MEALY GREY coal.

CHEADLE COALFIELD.

In the Cheadle Coalfield are the following seams:—TWO-YARD coal, HALF-YARD coal, YARD coal, LITTLEY coal, FOUR-FOOT coal, WOODHEAD THREE-FOOT coal.

Lowest coal measures contain the CRABTREE coal, WOODHEAD coal, DILHORNE seam.

DERBYSHIRE COALFIELD.

The principal seams are the LITTLE coal, MAIN coal, WOODFIELD coal, STOCKINGS coal, EUREKA coal and KILBURN coal. The classes raised are house and steam varieties.

Other seams in Derbyshire coalfield are TOP HARD, which, near Chesterfield, is a strong splint coal, very durable, and used extensively in iron manufacture; SOFT coal, a good household and gas coal; CLOD OR BLACK SHALE; KILBURNE coal.

At Shipley, besides the TOP HARD coal, there are the GREAVES coal; WATERLOO coal, a seam of cannel; BRIGHT SOFT coal; BOTTOM HARD coal, a splint coal.

NOTTINGHAM COALFIELD.

The chief workable seams are the TOP HARD, DEEP SOFT, DEEP HARD, KILBURN coal.

At Shirebrook Colliery the following seams occur:—MANOR coal, SHIREOAK, MELTON or BAELBRO' HALL coal, FURNACE coal, HAZLES coal, TOP HARD (or Barnsley) coal, DUNSHILL coal, WATERLOO coal, SOFT coal, LOWER HARD, PIPER coal, FURNACE coal, KILBURN coal.

The TOP HARD and LOWER HARD seams are excessively hard, bright coal; they light easily, and crackle when thrown on fire; they burn freely, leaving a white ash and considerable clinker. The lower bed has more pyrites and greater amount of ash.

LEICESTERSHIRE COALFIELD.

The coals are all of the usual Midland bituminous type, and are employed for domestic, manufacturing, forge and brickmaking purposes.

In the Moira district the chief seams are:—ELL coal; FIVE-FEET coal; MAIN coal, most important seam; SLATE coal; WOODFIELD coal; STOCKING coal, EUREKA coal

In the Coleorton area the seams are:—COLEORTON MAIN and MOIRA, one of principal seams; UPPER and LOWER LOUNTS; LOUNT NETHER; ROASTER coal or LOWER MAIN, one of principal seams.

A few cannel coals occur and are worked with other seams.

At Ibstock, the MINGY or CLEFT coal is used for steam and household purposes. It is not a coking coal, and behaves like an ordinary splint.

At Whitwick Colliery the coal gives a firm compact coke.

WARWICKSHIRE COALFIELD.

All the seams are ordinary bituminous coals, suitable for household, steam-raising, and brick-burning. The chief seams are:—

FOUR-FOOT, TWO-YARD, RYDER (not in the north), BARE (not in the north), ELL, SLATE (not in the north). These four seams are united towards south to one seam, the HAWKESBURY seam. SEVEN-FEET, most persistent seam; DOUBLE or DEEP, BENCH (absent in south).

Much of this coal is used for domestic purposes, the small being used for lime and brick-making.

COALBROOKDALE COALFIELD.

Seams most worked are all in Lower Measure, and include FUNGUS coal, TOP coal, DOUBLE coal, YARD coal, BIG FLINT coal, NEW MAIN coal, BEST coal, CLOD and RANDLE coal, LITTLE FLINT coal. All are bituminous coals, used for household, steam-raising and smelting. Some thin sulphurous coals in higher measures are coked for malt kilns, hop-drying, &c. The TOP, YARD, DOUBLE and BIG FLINT coals are largely used for manufacturing. CLOD and LITTLE FLINT are used for iron smelting. FUNGUS coal is suitable for general purposes.

FOREST OF WYRE COALFIELD.

Seams resemble those of Coalbrookdale. The Lower Measures yield the "Sweet coal" seams, the Upper Measures the "Sulphur Coal" series.

FOREST OF DEAN COALFIELD.

The seams include WOORGREENS coal, CROWDELF coal, SMITH coal, FOOT coal, LOWERY coal, STARKEY coal, ROCKEY coal, BREADLESS coal, CHURCHWAY HIGHDELF coal, NO coal, BRAZILLY coal, YORKLEY coal, WHITTINGTON coal, COLEFORD HIGHDELF coal, TRENCHARD coal. The coal is mainly used for household, manufacturing and gas-making purposes, with a small proportion for steam-raising. Broadly speaking, the upper series are almost exclusively used for household purposes and a little for gas. The lower series are manufacturing and steam coals.

SOMERSET COALFIELD.

The upper series are chiefly developed in southern basin (Radstock). Workable lower seams are the Parkfield or Coalpit Heath series (Farrington series). The middle (Pennant) measures contain good smith's coal in the northern part, changing to house coal in the south at Nettlebridge.

The following are the chief seams in the Upper Coal Measures:—HARD VEIN, TOP VEIN, HOLLYBUSH VEIN, GREAT VEIN. These are gas and house coals. The gas coals have rather more ash, but otherwise compare well with Durham gas coals.

In the Pennant series are the following seams:—MANGOTSFIELD TOP, MANGOTSFIELD MIDDLE, MANGOTSFIELD LITTLE, COCK seam, HEN seam, PARROT, BRIMSTONE. These are chiefly used for smiths' coal.

In the Lower Coal Measures are the following:—DOXALL seam, UPPER FIVE coals, ROCK, PRIMROSE, LYALONG, UPPER TOAD, HOLE VEIN, LOWER FIVE coals, THOROFARE, GREAT VEIN, GILLER'S MU, LITTLE TOAD, LITTLE FIERY, PARKER'S seam, ASHTON TOP seam, ASHTON GREAT seam. These are steam and house coal worked chiefly south of the anticlinal. The thickest seams, the Vobster series, are coking coals.

SOUTH WALES COALFIELD.

I.—THE STEAM COAL REGION.

In the Monmouthshire coalfield there are semi-bituminous, steam, gas, and house coal seams. The top seam in the Newport area is the MYNYDDISLWYN seam, a bituminous household coal now nearly exhausted. Then follows the TILLERY seam, the ELLED seam or NEW VEIN, BIG VEIN (steam coal), RED VEIN or THREE-QUARTER seam (steam coal), BLACK VEIN, a coal with good heating qualities, burning with a bright flame, making a clean fire, and yielding coke of good quality—this is the best Monmouthshire steam coal, MEADOW VEIN, OLD COAL seam.

In the northern part, the Pennant series contains thin seams of house and coking coal, and the lower series contains the seven or eight well-known Welsh steam coals.

In Glamorganshire, at Aberdare, the steam coal seams include the following seams:—TWO-FEET MINE, FOUR-FEET, NO. 1 YARD, SIX-FEET, RED COAL, NINE-FEET, BUTE, NO. 2 YARD, SEVEN-FEET, NO. 3 YARD. One of the chief seams in the county is the GRAIGOLA VEIN, known also as the GRAIG MERTHYR or SIX-FEET VEIN. It is a free-burning steam coal, giving a good yield of coke. Rhymney Valley has both steam coal and also bituminous coal suitable for house, gas and coking purposes. The best known bituminous seams are the MYNYDDISLWYN and the BRITHDIR, which lie above the steam coal seams. Generally speaking, the bituminous varieties occur in all the seams in this part of the area, but mostly in the upper seams. The semi-bituminous coals occur roughly in the centre of the coalfield, the anthracite on the north-west, and the bituminous coals on the south-east. There is every gradation between these varieties, and good coking coal occurs between the bituminous and semi-bituminous or steam coals. Although the seams get more anthracite westward, the

lower seams are the first to show the change. No. 2 Rhondda seam illustrates the loss of bituminous matter in a westward direction. Thus in Taff, Cynon and Rhondda valleys this is a bituminous coal, at Glyncorrwg it is a semi-bituminous steam coal, and in Vale of Neath it becomes a true steam coal.

In the Dulais Valley, the Big or Nine-Feet Vein and the Brass Vein are more anthracitic than in the Vale of Neath, and when picked free from pyrites are used for malting.

The Main Colliery Company work the following:—Little Bryncoch seam, Dirty seam, Wernffraith seam (probably the equivalent of Mynyddislwyn seam), Three-Feet seam, Victoria seam, Graigola seam, Hughes Vein.

At Port Talbot the North Fawr seam is friable, but makes a good house and steam coal, also useful for manufacturing, and when washed makes first-class coke; the South Fawr seam is a fairly hard bituminous coal, and a good house and coking coal; the Six-Feet seam is hard bituminous coal, making a good household coal, and cokes well; the Nine-Feet seam is a soft bituminous coal of inferior quality; the Cribbwr Faur seam is a most valuable house coal, and first-class coking and steam coal; the Boddwr Vawr is a tender coal, but makes excellent coke of great repute for iron manufacture; the Rock Vawr is a rather tender steam coal, excellent for stationary engines.

At Pontypool the New Vein or Elled coal, Red Vein or Three-Quarter coal, Rock Vein or Black Vein, Meadow Vein, and Old coal are worked.

In the Great Western Colliery the seams worked include the Rhondda No. 1, No. 2, No. 3, Hafod seam, Abergorglie seam, and Six-Foot seam.

In the Pontypridd area, Llantwit No. 2 and No. 3 are valuable house coals. The Bettws Four-Feet seam is of similar character.

Mr. T. Forster Brown has thus generally described the character of South Wales coalseams. Generally all the coalseams west of Carmarthen Bay are anthracitic. Eastwards, the Gower seams and the upper seams of Llanelly, as well as nearly all the coals of the white ash series south and east of a line drawn from Gower River to Neath, Cymmer, Ystrad, Ferndale, Navigation and Merthyr, are more or less bituminous—the same seams north and west of that line being steam coals in the Aberdare and Rhondda districts, changing gradually to anthracite west of the Vale of Neath.

2.—THE ANTHRACITE REGION.

In Pembrokeshire the chief seams are the Rock Vein, Timber Vein, and Bonney Vein (equal Stinkard Vein). These are the best quality anthracite, but the seams are often thin. The Low-Level and Kilgetty are the two seams

most worked, and producing hard anthracite with large proportion of large coal. Most of the other seams produce chiefly small coal, much used for house purposes locally, and the large coal is shipped for malting.

In the GWENDRAETH Valley (Carmarthen), the chief seams are the BIG VEIN, STANLLYD, and PUMP QUART. These are harder than the Pembroke seams, but have less carbon, and are somewhat inferior near Llanelly. Towards the north-east, although not so good as Pembroke in quality, they are well adapted for malting.

In the CWMAMAN Valley (Carmarthen and Brecon), the BIG VEIN (representing the Stanllyd of above area), has the best reputation. The BRASS VEIN is of excellent quality, as also is the DIAMOND VEIN. The FURNACE or FOUR-FEET seam is largely used for iron-smelting. Further eastwards in this valley the coals get rather inferior, with less carbon, but are hard and suitable for lime-burning.

THE IRISH COALFIELDS.

LEITRIM.

In the Arigna coalfield there are three seams of bituminous coal of which the TOP seam is most valuable. The TOP seam at Aughabehy is a rich, black coal, easily broken, giving off much gas and yielding a porous coherent coke. The ROVER coal is less bituminous and gives a less coherent coke.

TYRONE.

The Dungannon coalfield contains the following workable seams in the Coal Island series :—ANNAGBER seam, a soft quality coal; BONE coal ; SHINING seam ; BRACKAVILLE seam, good quality, bituminous coal; GORTNASKEA coal, with 22 in. seam of cannel containing very little ash ; BELTIBOY coal, rather sulphurous. Then there is the DERRY coal, good quality, bituminous coal; YARD coal, good quality, bituminous coal ; GREENAGH coal, with 14 in. of cannel, and the Drumglass series, consisting of the MAIN coal of Drumglass, variable quality ; LOWER coal of Drumglass. All the above seams are highly bituminous, and with the exception of the DERRY coal, are good gas coals. Their heating power is high.

ANTRIM.

At Ballycastle three seams occur, TOP or FIRST coal known as the SPLINT seam, the HAWKSNEST seam and the MAIN seam. The coals are dull, black and bituminous, giving off much gas, and making a porous coke.

LEINSTER.

In the Castlecomer district there are several seams of anthracite coal, of which the DOUBLE seam, THREE-FOOT and FIVE-FOOT coals are the thickest.

The coal of the Slievardagh coalfield in Tipperary is chiefly anthracite. The RUSHES and POLLOUGH are the best known seams.

MUNSTER.

At Kanturk, in co. Cork, the SWEET VEIN has been worked. It is an anthracite of similar quality to the above. Other seams in this area are softer, are more slaty than in the Leinster coalfield.

ANALYSES

OF

BRITISH COALS AND COKE.

PART I.—COALS.

CHESHIRE.

Notes.

BREDBURY COLLIERY COMPANY LIMITED,

Bredbury, near Stockport.

Colliery—LINGARD LANE, Five Feet Seam, No. 1 Pit.

Shipping Port—Partington Docks, Manchester Ship Canal.

Rail—Great Central and Midland Joint, Bredbury Station.

Canal— . . . . . .

Arden Screened Gas Coal.

Class of Coal—Gas.

Purified gas per ton	10,115 cubic feet.
Illuminating power	18·39 standard candles.
Weight of coke	14½ cwt.
Quality	good.
Liquor	33 gallons.
Tar	16 gallons.
Sulphuretted hydrogen	1,014 grains.

Heating power, 12·92 lb. water at 212 degs. Fahr. evaporated by the combustion of 1 lb. of coal.

Analyst— . . . . . .

Date of Analysis—February 17, 1906.

Notes.

CHESHIRE.

RT. HON. LORD VERNON,

Poynton, near Stockport.

Colliery—POYNTON, ... Seam, Quarry Pit.
Shipping Port—Partington.
Rail—L. and N.W. and Great Central, Poynton Station.
Canal—Great Central (Macclesfield Canal).

Two-feet Coal.

Class of Coal—Manufacturing and Gas.

This seam is from 1 ft. 10 in. to 2 ft. in thickness, and is a bituminous coal suitable for manufacturing purposes and as a gas coal.

Specific gravity	1·285	
Purified gas per ton	10,400	cubic feet.
Illuminating power of gas	20·740	standard candles
Illuminating matter in terms of sperm per ton	739·520	lb.
Coke per ton	1,437	lb.
Coke per cent.	64·150	per cent.
Fixed carbon in coke	86	per cent.
Ash in coke	4	per cent.
Sulphur in coal	1·310	per cent.

Calorimetric value—equal to evaporation of 14·30 lb. of water from 212 degs. Fahr. by combustion of 1 lb. of coal.

Analyst—E. L. Newbigging.
Date of Analysis—October 1903.

Colliery.—POYNTON, ... Seam, Park Pit.

Gees Coal.

Class of Coal—House and Gas.

This seam is from 3 ft. 5 in. to 3 ft. 8 in. thick, and is a bituminous coal, suitable for house coal and as a gas coal.

Specific gravity	1·272	
Purified gas per ton	10,600	cubic feet.
Illuminating power of gas	19·040	standard candles.
Illuminating matter in terms of sperm per ton	691·960	lb.
Coke per ton	1,484	lb.
Coke per cent.	66·250	per cent.
Fixed carbon in coke	96	per cent.
Ash in coke	4	per cent.
Sulphur in coal	0·930	per cent.

Calorimetric value, equal to evaporation of 14·30 lb. of water from 212 degs. Fahr. by combustion of 1 lb. of coal.

Analyst—E. L. Newbigging.
Date of Analysis—October 1903.

Notes.

CHESHIRE.

Colliery—POYNTON, ... Seam, Anson Pit.

Reform Coal.

Class of Coal—Steam and Gas.

This seam is from 2 ft. 6 in. to 2 ft. 8 in. thick, and is a bituminous coal used for steam-raising and gas-making.

Specific gravity	1·285
Purified gas per ton	10,500 cubic feet.
Illuminating power of gas	20·520 standard candles.
Illuminating matter in terms of sperm per ton	738·720 lb.
Coke per ton	1,484 lb.
Coke per cent.	66·250 per cent.
Fixed carbon in coke	94 per cent.
Ash in coke	6 per cent.
Sulphur in coal	0·900 per cent.

Calorimetric value, equal to evaporation of 14·57 lb. of water from 212 degs. Fahr. by combustion of 1 lb. of coal.

Analyst—E. L. Newbigging.
Date of Analysis—October 1903.

Colliery—POYNTON, ... Seam, Lawrance Pit.

Accommodation Coal.

Class of Coal—House and Gas.

This seam is from 7 ft. to 7 ft. 6 in. thick, and is a bituminous coal suitable for house use and as a gas coal.

Specific gravity	1·293
Purified gas per ton	10,850 cubic feet.
Illuminating power of gas	20·100 standard candles.
Illuminating matter in terms of sperm per ton	747·720 lb.
Coke per ton	1,391 lb.
Coke per cent.	62·090 per cent.
Fixed carbon in coke	92 per cent.
Ash in coke	8 per cent.
Sulphur in coal	1·800 per cent.

Calorimetric value equal to evaporation of 14·30 lb. of water from 212 degs. Fahr. by combustion of 1 lb. of coal.

Analyst—E. L. Newbigging.
Date of Analysis—October, 1903

Notes.

CUMBERLAND.

ALLERDALE COAL COMPANY LIMITED,

Workington.

Colliery—ALLHALLOWS . . . . . Seam . . . . . Pit.
Shipping Port—Maryport.
Rail—Maryport and Carlisle, Mealsgate Station.
Canal— . . . . . .

Allhallows Coal.

Class of Coal—Gas.

		Per cent.
Volatile matters, containing 0·75 per cent. sulphur		25·75
Coke, consisting of—		
Carbon	67·81	
Sulphur	0·54	
Ash	3·90	
		72·25
Water expelled at 212 degs.		2·00
		100·00

Gaseous products—		
Gas per ton of coal	10,900	cubic feet.
Gas from 1 cubic foot of coal	393·5	cubic feet.
Illuminating power of the gas in standard candles	17·42	candles.
Value of 1 cubic foot of gas in sperm	425·3	grains.
Value of gas from 1 ton of coal, in sperm	662·3	lb.
Hydrocarbons absorbed by bromine	6·3	per cent.
Sulphuretted hydrogen (H_2S) in foul gas	5·0	per cent.
Carbonic acid (CO_2) in foul gas	1·9	per cent.
Carbonic oxide (CO) in foul gas	0·3	per cent.
Sulphur eliminated with volatile products per ton of coal	16·8	lb.
Liquid products—		
Tar per ton of coal	17·5	gallons.
Ammoniacal liquor per ton of coal	12·4	gallons.
Strength of ammoniacal liquor	2·4	degs.
Hygrometric water per ton of coal	4½	gallons.
Solid products—		
Coke per ton of coal	1,482½	lb.
Carbon in the coke	94·00	per cent.
Ash in the coke	5·40	per cent.
Sulphur in the coke per ton of coal	11·08	lb.

CUMBERLAND.

Notes.

Lustrous black mixed with dull black; breaks easily; traces of pyrites and carbonate of lime; specific gravity, 1,291 (water 1,000); 1 cubic foot weighs 80¾ lb.; coke of fair quality; colour of ash, light fawn.

Analyst—J. Hepworth.

Date of Analysis— . . . . . .

Colliery . . . . . Seam . . . . . Pit.

Shipping Port—Workington.

Rail—Cleator and Workington Junction, Great Broughton Station.

Canal— . . . . . .

Little Main Coal.

Class of Coal—Gas.

		Per cent.
Volatile matters (containing 0·95 per cent. sulphur)		28·25
Coke, consisting of—		
Carbon	63·04	
Sulphur	0·96	
Ash	3·60	
	——	67·60
Water expelled at 212 degs.		4·15
		100·00

Gaseous products—	
Gas per ton of coal	9,600 cubic feet.
Gas from 1 cubic foot of coal	351 cubic feet.
Illuminating power of the gas, in standard candles	15·82 candles.
Value of 1 cubic foot of gas, in sperm ..	379·6 grains.
Value of gas from 1 ton of coal, in sperm	520·6 lb.
Hydrocarbons absorbed by bromine ..	2·3 per cent.
Sulphuretted hydrogen (H_2S) in foul gas	3·2 per cent.
Carbonic acid (CO_2) in foul gas	2·0 per cent.
Carbonic oxide (CO) in foul gas	6·1 per cent.
Sulphur eliminated with volatile products, per ton of coal	6·01 lb.
Liquid products—	
Tar per ton of coal	20¼ gallons.
Ammoniacal liquor per ton of coal ..	17¼ gallons.

Notes.

CUMBERLAND.

Little Main Coal—*cont.*

Solid products—

Coke per ton of coal	1,480 lb.
Carbon in the coke	94·6 per cent.
Ash in the coke	5·4 per cent.
Sulphur in the coke per ton of coal ..	21·5 lb.

Specific gravity, 1,312 (water 1,000); 1 cubic foot weighs 82 lb.: coke, good for fuel.

Analyst—J. Hepworth.

Date of Analysis— . . . . . .

ALSTON AND NENTFORCE LIMESTONE QUARRY COMPANY,

10, Neville Street, Newcastle-on-Tyne.

Colliery—BLAGILL . . . . . Seam . . . . . Pit.

Shipping Port— . . . . .

Rail—North Eastern, Alston Station.

Canal— . . . . . .

"Crow" Coal.

Class of Coal—Manufacturing.

The Alston and Nentforce Limestone Quarry Company work the "Crow" coal of the mountain limestone district of Alston.

	Per cent.
Moisture	3·72
Volatile matter	12·93
Fixed carbon	76·88
Ash	6·47
	100·00

This analysis was made at the Durham College of Science, and the professor of geology at the same college expressed the following opinion :—"This is obviously very near the composition of an anthracite—shows more fixed carbon, in fact, than many semi-anthracites. The amount of moisture is rather strange in so ancient a coal, unless the specimen was very long exposed upon the surface. The ash is exceedingly ferruginous."

Analyst— . . . . . .

Date of Analysis— . . . .

CUMBERLAND.

Notes

SIR JAMES BAIN & COMPANY,

Harrington.

Colliery—HARRINGTON, Six Quarter Seam, No. 9 Pit.

Shipping Port—Harrington.

Rail—L. and N. W., Harrington Station.

Canal— . . . . . .

Harrington Gas Coal.

Class of Coal—Gas.

		Per cent.
Volatile matters (containing 1·75 per cent. sulphur)		32·68
Coke, consisting of—		
Carbon	62·57	
Sulphur	0·50	
Ash	3·00	
		66·07
Water expelled at 212 degs.		1·25
		100·00

Gaseous products :—	
Gas per ton of coal	10,520 cubic feet.
Gas from 1 cubic foot of coal	376·2 cubic feet.
Illuminating power of the gas in standard candles	16·39 candles.
Value of 1 cubic foot of gas in sperm	393·36 grains.
Value of gas from 1 ton of coal in sperm	591·16 lb.
Hydrocarbons absorbed by bromine	5·2 per cent.
Sulphuretted hydrogen (H_2S) in foul gas	2·1 per cent.
Carbonic acid (CO_2) in foul gas	3·1 per cent.
Sulphur eliminated with volatile products, per ton of coal	15·01 lb.
Liquid products :—	
Tar per ton of coal	13·75 gallons.
Ammoniacal liquor per ton of coal	11·96 gallons.
Strength of ammoniacal liquor	2·8 degs.
Hygrometric water per ton of coal	2·80 gallons.
Solid products :—	
Coke per ton of coal	1,480 lb.
Carbon in the coke	94·70 per cent.
Ash in the coke	4·54 per cent.
Sulphur in the coke per ton of coal	11·20 lb.

A mixture of coal, with small seam of shale ; fracture, slaty ; cross-fracture, conchoidal. It contains very slight traces of pyrites and of carbonate of lime. Specific gravity, 1,282 (water, 1,000); 1 cubic foot weighs 80·1 lb. ; coke, fair ; colour of ash, red.

Analyst—J. Hepworth.

Date of Analysis—April 21, 1893.

Notes.

CUMBERLAND.

Mr. JOSEPH HARRIS,

Brayton Domain Colliery, Brayton, S.O.

Colliery—BRAYTON DOMAIN, Yard Band Seam, No. 4 Pit.
Shipping Port—Maryport, Silloth.
Rail— . . . . . , Brayton Station.
Canal— . . . . . .

Brayton Domain Gas Coal (Screened).

Class of Coal—Gas, Steam, Manufacturing and House.

		Per cent.
Volatile matters (containing 0·16 per cent. sulphur)		36·10
Coke consisting of—		
Carbon	56·81	
Sulphur	0·44	
Ash	4·40	
	——	61·65
Water expelled at 212 degs.		2·25
		100·00

Gaseous products—	
Gas per ton of coal	11,600 cubic feet.
Gas from 1 cubic foot of coal	404·65 cubic feet.
Illuminating power of the gas in standard candles	15·82 candles.
Value of 1 cubic foot of gas, in sperm ..	397 grains.
Value of gas from 1 ton of coal, in sperm	597·76 lb.
Hydrocarbons absorbed by bromine ..	4·4 per cent.
Sulphuretted hydrogen (H_2S) in foul gas	5·0 per cent.
Carbonic acid (CO_2) in foul gas	2·5 per cent.
Carbonic oxide (CO) in foul gas	2·6 per cent.
Sulphur eliminated with volatile products, per ton of coal	3·58 lb.
Liquid products—	
Tar per ton of coal	18·7 gallons.
Ammoniacal liquor per ton of coal ..	12·5 gallons.
Strength of ammoniacal liquor	2½ degs.
Solid products—	
Coke per ton of coal..	1,360 lb.
Carbon in the coke	92·81 per cent.
Ash in the coke	7·19 per cent.
Sulphur in the coke per ton of coal ..	9·85 lb.

The section of coal consisted of layers of lustrous black coal and dull black splint coal; the latter broke with an irregular fracture and

Notes.

was very close and compact. There were few traces of carbonate of lime, but no pyrites. Specific gravity 1,295 (water 1,000); 1 cubic foot = 80·93 lb. The coke is of very fair quality, and owing to the small quantity of ash it contains, it will be good for domestic or manufacturing purposes.

Analyst—J. Hepworth.
Date of Analysis—February and March, 1893.

Messrs. THOMPSON & SONS,

Kirkhouse, Brampton Junction.

Colliery—BLENKINSOPP, "Byron" Seam, Byron Pit.
Shipping Port—Silloth.
Rail—North Eastern, Greenhead Station.
Canal— . . . . . .

"Byron" Gas Coal.

Class of Coal—Gas, House and Steam.

		Per cent.
Volatile matters (containing 0·19 per cent. sulphur)		29·30
Coke, consisting of—		
Carbon	61·77	
Sulphur	0·38	
Ash	4·80	
		66·95
Water expelled at 212 degs.		3·75
		100·00

Gaseous products—	
Gas per ton of coal	10,833 cubic feet.
Gas from 1 cubic foot of coal	353 cubic feet.
Illuminating power of the gas in standard candles	17·10 candles
Value of 1 cubic foot of gas, in sperm ..	410·4 grains.
Value of gas from 1 ton of coal, in sperm	635·1 lb.
Hydrocarbons absorbed by bromine ..	4·00 per cent.
Sulphuretted hydrogen (H_2S) in foul gas	0·12 per cent.
Carbonic acid (CO_2) in foul gas	1·10 per cent.
Carbonic oxide (CO) in foul gas	0·57 per cent.
Sulphur eliminated with volatile products, per ton of coal	4·35 lb.

Notes.

CUMBERLAND.

"Byron" Gas Coal—*cont.*

Liquid products—

Tar per ton of coal	6·25 gallons.
Ammoniacal liquor per ton of coal ..	6·50 gallons.
Strength of ammoniacal liquor	3·00 degs.
Hygrometric water per ton of coal ..	8·40 gallons.

Solid products—

Coke per ton of coal..	14 cwt. 2 qrs. = 1,624 lb.
Carbon in the coke	92·95 per cent.
Ash in the coke	7·05 per cent.
Sulphur in the coke per ton of coal ..	8·51 lb.

Coke very hard and spongy; of superior quality.

Illuminating power tested with Bray's No. 8 U.J.

Analyst—J. Hepworth.

Date of Analysis—June 24, 1884.

WHITEHAVEN COLLIERY COMPANY,

Whitehaven.

Colliery—WHITEHAVEN, Main Band Seam, William, Wellington and Croft Pits.

Shipping Port—Whitehaven.

Rail—Furness, and L. and N. W., Whitehaven Station.

Canal— . . . . . .

Whitehaven Coal.

Class of Coal— . . . . . .

From the Earl of Lonsdale's Whitehaven Collieries, leased to and worked by the Whitehaven Colliery Company; containing all the seams of the Cumberland Coalfield, only two of which—the Main Band and Bannock Band—are at present worked.

	Sample as received. Per cent.	Dried at 212° F. Per cent.
Fixed carbon	62·96	64·84
Volatile matter	32·04	33·00
Sulphur	0·64	0·66
Ash	1·46	1·50
Moisture	2·90	—
	100·00	100·00

Calorific power by Thomson's calorimeter .. 14·3 lb.

CUMBERLAND.

Notes.

The calorific power represents the number of pounds of water at 212 degs. Fahr. which would be evaporated if the whole of the heat produced by the combustion of 1 lb. of the moisture-free coal were conveyed to the water.

Analyst—Robert Hellon.

Date of Analysis—October 15, 1903.

Whitehaven Coal.

Class of Coal— . . . . . .

The coal is strong bituminous coal with high calorific power.

Calorific power of coal dried at 212 degs. Fahr. 14·705 B.T.U

Raw coal yields—	Per cent.
Fixed carbon	62·5
Volatile matter	32·8
Ash	4·25
Moisture	3·00

Analysts—Snelus and Son.

Date of Analysis—September 17, 1894.

Notes.

DERBYSHIRE.

HARDWICK COLLIERY COMPANY LIMITED,

Heath, Chesterfield.

Colliery—HARDWICK, Cavendish or Tupton Seam, Holmewood Pit.
Shipping Ports—Hull, Grimsby, Lynn, Partington and Liverpool.
Rail—Midland, Great Central, L. and N. W., Great Northern, Heath Station, Great Central.
Canal— . . . . . .

Hardwick Cavendish Bright Gas Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal is black, possesses considerable lustre and brown streak, fracture fairly regular and defined by thin deposits of charcoal; cross-fracture angular, and resinoid to crystalline, columnar in natural partings, and containing slight deposits of calcium carbonate and ferric bisulphide, moderately cohesive and compact; under distillation it intumesces and agglomerates. Colour of ash, dark brown. Mean specific gravity 1,244 (water 1,000). Weight of 1 cubic foot, 77·75 lb.

		Per cent.
Volatile matters (containing 0·63 of sulphur)		33·87
Coke consisting of:—		
Carbon	58·04	
Sulphur	0·24	
Ash	3·59	
		61·87
Water expelled at 212 degs. Fahr.		4·26
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar. press.	12,095 cubic feet
Gas from 1 cubic foot of the coal	415·35 cubic feet
Specific gravity of the gas	485 (air 1,000)
Hydrocarbons absorbed by bromine ..	5·75 per cent.
Durability of 1 cubic foot by 5 in. jet flame	47 min. 16 sec.
Value of 1 cubic foot of gas in sperm ..	510·24 grains
Value of gas from 1 ton of coal in sperm	881·62 lb.
Illuminating power of gas in standard candles (per London Argand)	21·26 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·75 per cent.
Carbonic acid (CO_2) in foul gas	2·25 per cent.
Carbonic oxide (CO) in foul gas	6·50 per cent.
Sulphur eliminated with volatile products	14·11 lb.

DERBYSHIRE.

Notes.

Liquid products—	
Tar per ton of coal	15·17 gallons
Ammoniacal liquor, per ton of coal .	16·40 gallons
Strength of ammoniacal liquor	3·00 degs. Twadd.
Hygrometric water, per ton of coal ..	9·44 gallons
Aqueous absorbent capacity of coal (determined by complete saturation).. ..	6·60 per cent.
Solid products—	
Coke per ton of coal..	1,385·88 lb.
Carbon in the coke	94·20 per cent.
Ash in the coke	5·80 per cent.
Sulphur in coke per ton of coal	5·37 lb.
Heating power of 1 lb. of coke (water from boiling point into steam).. ..	12·93 lb.

This gas and coking coal is easily distilled, yields a large amount of illuminating matter, and affords 12·37 cwt. per ton of first-class coke. The foul gas at same time contains a moderate percentage of impurities. Compared with Main Lesmahagow Cannel Coal, represented by 100 (calculated on the bases of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 64·59.

Analyst—Geo. R. Hislop.

Date of Analysis—March 7, 1903.

Colliery—HARDWICK, Silkstone or Blackshale Seam, Holmewood and Williamsthorpe Pits.

Hardwick Silkstone or Blackshale Gas Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal is black, possesses considerable lustre and brown streak, fracture rather irregular with deposits of charcoal and partly laminated; cross-fracture highly angular, hackly, and resinoid to crystalline, in natural partings inclines to columnar and striated with deposits of calcium carbonate and ferric bisulphide, cohesive and compact; under distillation it intumesces and agglomerates. Colour of ash, dark brown. Mean specific gravity 1,228 (water 1,000). Weight of 1 cubic foot, 76·75 lb.

Notes.

DERBYSHIRE.

Hardwick Silkstone or Blackshale Gas Coal—*cont.*

		Per cent.
Volatile matters (containing 0·65 of sulphur)		34·14
Coke, consisting of:—		
Carbon	59·28	
Sulphur	0·18	
Ash	2·10	
		61·56
Water expelled at 212 degs. Fahr.		4·30
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar. press.	12,370 cubic feet
Gas from 1 cubic foot of the coal	423·83 cubic feet
Specific gravity of the gas	480 (air 1,000)
Hydrocarbons absorbed by bromine ..	5·50 per cent.
Durability of 1 cubic foot by 5 in. jet flame	45 min. 48 sec.
Value of 1 cubic foot of gas in sperm ..	496·32 grains
Value of gas from 1 ton of coal in sperm	877·06 lb.
Illuminating power of gas in standard candles (per London Argand)	20·68 standard candles
Sulphuretted hydrogen (H_2S) in foul gas	1·75 per cent.
Carbonic acid (CO_2) in foul gas	2·20 per cent.
Carbonic oxide (CO) in foul gas	6·50 per cent.
Sulphur eliminated with volatile products	14·56 lb.
Liquid products—	
Tar per ton of coal	15·40 gallons
Ammoniacal liquor, per ton of coal .	16·00 gallons
Strength of ammoniacal liquor	3·25 degs. Twadd.
Hygrometric water, per ton of coal ..	9·63 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	6·73 per cent.
Solid products—	
Coke per ton of coal..	1,378·94 lb.
Carbon in the coke	96·60 per cent.
Ash in the coke	3·40 per cent.
Sulphur in coke per ton of coal	4·03 lb.
Heating power of 1 lb. of coke (water from boiling point into steam).. ..	13·27 lb.

The foregoing results prove this to be a remarkably good gas and coking coal, yielding, as it does, a large volume of 20·68 candle gas, and at the same time 12·31 cwt. per ton of exceptionally pure coke. Compared with Main Lesmahagow cannel coal represented by 100 (calculated

on the bases of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas, this coal is equal to 63·86.

Analyst—Geo. R. Hislop.

Date of Analysis—March 7, 1903.

MANNERS COLLIERY COMPANY LIMITED,

Ilkeston.

Colliery—MANNERS, Piper and Low Main Seams, Kilburn Pit.
Shipping Ports—Hull, Goole, Lynn, Partington.
Rail—Midland, Great Northern, L. and N. W., Great Central, Ilkeston Station.
Canal— . . . . . .

Kilburn Coals.

Class of Coal— . . . . . .

	Peas.	Slack.	Smudge.	Small Nuts.
Water	5·96	2·82	7·37	6·56
Sulphur	1·95	2·14	2·13	2·04
Ash	3·65	3·44	9·20	3·00
Calorific value in B.T.U.'s	14,247	14,527	13,308	13,778

Analyst—S. R. Trotman.

Date of Analysis—May, 1906.

Kilburn Small Nuts.

Class of Coal—House and Manufacturing.

	Per cent.
Carbon	75·00
Hydrogen	4·99
Ash	3·00
Sulphur	2·04
Nitrogen	1·04
Calorific power in B.T.U.'s	13,778

Analyst—S. R. Trotman.

Date of Analysis—1905.

Notes.

DERBYSHIRE.

Colliery—MANNERS, ... Seam, Rutland Pit.

Low Main Coal.

Class of Coal—House, Gas and Manufacturing.

Make of gas per ton	10,400 cubic feet
Illuminating power	14½ candles
Non-volatile matters, including coke	54·5
Volatile matters, including water ..	45·5

A complete ultimate analysis of the coal was made, and the following results obtained:—

	Per cent.
Carbon	67·93
Hydrogen	4·45
Oxygen	10·16
Nitrogen	1·22
Sulphur	0·62
Ash	3·84
Water	11·78

Analysts—J. and H. S. Pattinson.

Date of Analysis—1904.

Rutland Coals.

Class of Coal— . . . . . .

	Piper hards.	Bakers' nuts.
Carbon	73·80	74·49
Hydrogen	4·56	4·78
Nitrogen	1·08	1·42
Oxygen	13·33	13·80
Sulphur	1·67	1·61
Ash	5·56	3·90
	100·00	100·00
Coke	56·70	57·36
Volatile matter	43·30	42·64
Calorific value in B.T.U.'s.. ..	13,009	13,455

Analyst—S. R. Trotman.

Date of Analysis—May, 1906.

DERBYSHIRE.

Notes.

Rutland Gas Coal.

Class of Coal—Gas.

Make of gas per ton at N.T.P. ..	10,700 cubic feet
Illuminating power	16½ candles
Coke per ton	11½ cwt.
Volatile matter	42·5
Fixed matter	57·5
Ash	4·20

The coke is of good quality.

Analyst—S. R. Trotman.

Date of Analysis—1905.

MICKLEY COAL CO. (DRONFIELD) LTD.,

Dronfield, Sheffield.

Colliery—MICKLEY, ... Seam, ... Pit.

Shipping Ports—Hull, Goole.

Rail—Midland, Dronfield and Dore-and-Totley Stations.

Canal— . . . . . .

Mickley Thin Seam Coal.

Class of Coal—Gas and Coking.

The following are the results of my examination of the sample of coal marked Mickley Thin Seam, from Mickley Colliery, Dronfield, received from you 29th ult. :—

Purified gas per ton	11,052 cubic feet.
Illuminating power of gas	18·8 standard sperm [candles.
Illuminating matter, in sperm per ton ..	712·0 lb.
Coke per ton	12·6 lb.
Coke per cent.	63·0 per cent.
Ash in coke	2·54 per cent.

This is an excellent gas coal.

It should be noted that the coke is exceptionally low in ash.

Analyst—Wm. McD. Mackey.

Date of Analysis—July 5, 1906.

Notes.

DERBYSHIRE.

Messrs. J. and N. NADIN & CO.,

Burton-on-Trent.

Colliery—STANTON . . . . . Seam . . . . . Pit.
Shipping Port—King's Lynn.
Rail—Midland and L. and N. W., Swadlincote Station.
Canal— . . . . . .

H.P. Steam and Unscreened Cobbles.

Class of Coal—Steam.

The following is an analysis of the seam of coal from which the H.P. steam and unscreened cobbles are made:—

	Per cent.
Moisture	10·4
Volatile matter	28·1
Non-volatile matter or coke	61·5
(Sample as received)	100·0

Analysis of dry coal:—

Carbon	70·0
Hydrogen	4·8
Sulphur	1·3
Ash (containing 0·2 per cent. salt)	8·8
Difference = oxygen and nitrogen	15·1
	100·0

Total thermal effect by Thomson's apparatus = 11·5 on dry coal.

Analysts—Matthews and Lott.

Date of Analysis—February 21, 1898.

SHEFFIELD COAL COMPANY LIMITED,

Birley, near Sheffield.

Colliery—BIRLEY, Silkstone Seam, South, East, West, and Brighton Pits.
Shipping Ports—Humber Ports, Partington, Liverpool, King's Lynn.
Rail—Great Central (Woodhouse Junction Station), and Midland (North Staveley Junction).
Canal—Nil.

Birley Silkstone Gas Coal.

Class of Coal—Gas.

Composition of coal as received—

	Per cent.
Ash	1·79
Sulphur	0·94
Volatile matter	33·47
Fixed carbon	61·87
Moisture	1·93
	100·00

DERBYSHIRE.

Notes.

Yield of coal as received—	
Coke per ton	12·90 cwt.
Gas per ton	11,040 cubic feet.
Illuminating power of gas, about	19 standard candles

The above coal is essentially a gas coal, and is very rich in residuals.

Analyst—Alex. E. Tucker.

Date of Analysis—March 29, 1894.

Specific gravity	1·278
Weight of 1 cubic foot	79·9 lb.
Proximate analysis—	Per cent.
Moisture	2·26
Volatile products	31·37
Fixed carbon	62·72
Sulphur	1·13
Ash (reddish grey)	2·52
Commercial analysis—	
Gas per ton of coal	11,680 cubic feet.
Gas per cubic foot of coal	417 cubic feet.
Illuminating power of the gas in standard sperm candles	16·92 candles
Sperm value of 1 cubic foot of the gas ..	406 grains
Sperm value of the gas per ton of coal ..	677 lb.
Coke per ton of coal	1,416 lb.
Coke per cent. in the coal	63·2 per cent.
Ash in the coke	3·99 per cent.
Sulphur eliminated with the volatile products	12·6 lb.
Sulphur in the coke	12·6 lb.
Tar per ton of coal	15·2 gallons
Liquor per ton of coal	21·4 gallons

Analyst—R. O. Paterson.

Date of Analysis—May 3, 1897.

Colliery—ASTON (North Staveley), Barnsley Seam, Aston Pit.

Aston (South Yorks.) Best Steam Hards.

Class of Coal—Steam.

Specific gravity	1·332
Moisture	3·78 per cent.
1 cubic foot weighs	83·0 lb.

Notes.

DERBYSHIRE.

Aston (South Yorks.) Best Steam Hards—*cont.*

Analysis of sample dried at 100 degs. Cent.—

	Per cent.
Carbon	78·88
Hydrogen	4·42
Oxygen and hydrogen	11·68
Sulphur	0·79
Ash (very light)	4·23
	100·00

Approximate analysis of other best South Yorkshire steam hards—

	Per cent.
Carbon	78 to 82
Hydrogen	4 to 5
Oxygen and nitrogen	8 to 12
Sulphur	0·50 to 1
Ash	4 to 6

Calorific value (calculated) in pounds of water which 1 lb. of coal will evaporate from 100 degs. Cent.—13·4 lb.

Analyst—C. K. Baker, F.I.C.

Date of Analysis—1903.

STANTON IRONWORKS COMPANY,

Teversall, Mansfield.

Colliery—PLEASLEY . . . . . Seam, Pleasley Pit.

Shipping Ports—Hull, Grimsby, Partington, Lynn, Boston.

Rail—Midland, Great Northern, Great Central, L. and N. W., Pleasley Midland and Great Northern Stations.

Canal— . . . . . .

Pleasley Cannel Coal.

Class of Coal—Steam, Manufacturing, Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal is black, possesses moderate lustre and moderate streak; fracture undulating to regular, with impressions of stigmaria, while cross-fracture is semi-conchoidal to angular, with deposits of ferric bisulphide and considerable deposits of calcium carbonate; moderately cohesive and compact; on the fire it does not intumesce; colour of ash,

DERBYSHIRE.

Notes.

pinkish white; thickness of seam, 10 in.; mean specific gravity, 1,258 (water 1,000); weight of 1 cubic foot, 78·62 lb.

		Per cent.
Volatile matters (containing 0·42 of sulphur)		41·09
Coke, consisting of—		
Carbon	48·27	
Sulphur	0·16	
Ash	8·37	
		56·80
Water expelled at 212 degs. Fahr. ..		3·10
		100·99

Gaseous products—	
Gas per ton of coal, at 60 degs. Fahr. and 30 in. bar	11,840 cubic feet.
Gas from 1 cubic foot of the coal	415·56 cubic feet.
Specific gravity of the gas	596 (air 1,000)
Hydrocarbons absorbed by bromine .	12·25 per cent.
Durability of 1 cubic foot by 5 in. jet flame	58 min. 36 sec.
Value of 1 cubic foot of gas, in sperm ..	699·84 grains.
Value of gas from 1 ton of coal, in sperm	1,183·73 lb.
Illuminating power of gas in standard candles	29·16 candles.
Sulphuretted hydrogen (H_2S) in foul gas	1·20 per cent.
Carbonic acid (CO_2) in foul gas	3·00 per cent.
Carbonic oxide (CO) in foul gas	6·00 per cent.
Sulphur eliminated with volatile products	9·45 lb.
Liquid products—	
Tar per ton of coal	20·75 gallons.
Ammoniacal liquor per ton of coal ..	12·75 gallons.
Strength of ammoniacal liquor	2·75 degs. Twadd.
Hygrometric water per ton of coal ..	6·94 gallons.
Aqueous absorbent capacity of coal (determined by complete saturation).. ..	4·80 per cent.
Solid products—	
Coke per ton of coal..	1,236·94 lb.
Carbon in the coke	86·80 per cent.
Ash in the coke	13·20 per cent.
Sulphur in the coke per ton of coal ..	3·54 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	11·92 lb.

This coal parts with its volatile products speedily under a good heat, and yields a large volume of 29·16 candle gas. The coke, however, is of medium quality. The coal contains a very moderate amount of both water and sulphur. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of

Notes.

DERBYSHIRE.

Pleasley Cannel Coal—*cont.*

13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas) this coal is equal to 78·42.

Analyst—Geo. R. Hislop.

Date of Analysis—November 2, 1894.

Pleasley Hard Coal.

Class of Coal—Steam, Manufacturing, House.

	As received.	Dried at 530 degs. Fahr.
Moisture	7·03	—
Ash	1·88	2·02
Sulphur	0·79	0·85
Hydrogen	4·81	5·17
Oxygen and hydrogen	8·83	9·50
Carbon	76·66	82·46
	100·00	100·00

Analyst—C. H. Bothomley.

Date of Analysis—May 18, 1889.

Notes.

DURHAM.

BEARPARK COAL AND COKE COMPANY LIMITED,

Middlesbrough.

Colliery—BEARPARK BRANCEPETH, Busty, Harvey, and Hutton Seams, ... Pit.

Shipping Ports—Tyne Dock (Sunderland and Hartlepools easy of access).

Rail—North Eastern, Witton Gilbert Station.

Canal— . . . . . .

Busty Seam.

Class of Coal—Steam, Gas and Coking.

	1st Analysis. Per cent.	2nd Analysis. Per cent.
Fixed carbon	68·44	68·28
Volatile hydrocarbons	26·85	27·00
Sulphur	0·77	0·77
Ash	3·10	3·10
Moisture	0·84	0·85
	100·00	100·00
Sulphur in ash	0·05	0·05
Yield of coke	71·95	

Analysis of coke produced—

	Per cent.
Carbon	95·13
Sulphur	0·57
Ash	4·30
	100·00

Examination for Gas—

On distilling the coal in a coal testing apparatus, and examining the gas produced in a photometer, fitted with Sugg's No. 1 London Argand burner, the following results were obtained :—

Yield of gas per ton of coal	10,250 cubic feet.
Illuminating power in standard sperm candles	15·5 candles.

Analysts—Pattinson and Stead.

Date of Analysis—July 18, 1879.

Notes.

DURHAM.

Harvey Seam.

Class of Coal—Gas and Coking.

	Per cent.
Fixed carbon	65·75
Volatile hydrocarbons	27·40
Sulphur	1·67
Ash	4·08
Moisture	1·10
	100·00

Yield of coke	71·50 per cent.
Sulphur in ash	0·12 per cent.

Analysis of coke—

	Per cent.
Carbon	92·58
Sulphur	1·72
Ash	5·70
	100·00

Yield of gas per ton of coal	10,192 cubic feet.
Illuminating power of gas	14·80 standard sperm [candles.
Light given by gas from one ton of coal when distilled, equal to	517·2 standard sperm [candles.
Yield of coke per ton of coal	14·30 cwt.

Analysts—Pattinson and Stead.

Date of Analysis—May 18, 1906.

Hutton Seam.

Class of Coal . . . . .

	Per cent.
Fixed carbon	70·13
Volatile hydrocarbons	23·94
Sulphur	0·78
Ash	4·45
Moisture	0·70
	100·00

Sulphur in ash	0·06
Yield of coke	75·0

Analysis of coke—

Carbon	93·51
Sulphur	0·56
Ash	5·93
	100·00

DURHAM.

Notes.

Yield of gas per ton of coal..	10,438 cubic feet.
Illuminating power of gas	16·5 standard candles.
Weight of standard sperm candles which will give the same light as the gas from one ton of coal	590·5 lb.

Analysts—Pattinson and Stead.
Date of Analysis—June 25, 1890.

BELL BROTHERS LIMITED,

Middlesbrough.

Colliery—BROWNEY, Hutton Seam . . . . . Pit.
Shipping Ports—West Hartlepool and Tyne Dock.
Rail—North Eastern, Ferryhill Station.
Canal— . . . . .

Browney Nuts.

Class of Coal—Gas, Steam, Manufacturing.

	Per cent.
Moisture	2·20
Ash	9·38
Sulphur	1·69
Volatile matter	30·90
Fixed carbon	55·83
	100·00

Analyst—Weldon Hanson.
Date of Analysis—March 1905.

Colliery—TURSDALE, Busty Seam . . . . . Pit.

Tursdale Screened Coal.

Class of Coal—Steam, Manufacturing.

	Per cent.
Moisture	1·52
Ash	7·60
Sulphur	1·12
Volatile matter	29·80
Fixed carbon	59·96
	100·00

Analyst—Weldon Hanson.
Date of Analysis—December 1905.

Notes.

DURHAM.

JOHN BOWES & PARTNERS LIMITED,

Milburn House, Newcastle-on-Tyne.

Colliery—FELLING, Beaumont, &c. Seams, Felling Pit.

Shipping Port—Felling-on-Tyne.

Rail—North Eastern, Felling Station.

Canal— . . . . . .

Tyne Main Coals.

Class of Coal—Gas.

On distilling the coal in a coal-testing apparatus the results were :—

Illuminating gas (per ton)	10,500 cubic feet.
Illuminating power of gas expressed in standard sperm candles	18·16 candles.
Sperm value (per ton)	653·76 lb.

The coke assay was :—

	Per cent.
Coke	71·3
Volatile matters	28·7
	100·0

The coke was of good quality.

A partial analysis of the coal was made, and the following results obtained :—

	Per cent.
Fixed carbon	63·73
Ash	7·57
Sulphur	1·23
Moisture	1·04

Analyst—W. H. Blake.

Date of Analysis— . . . . . .

Felling Main Gas Coal.

Class of Coal—Gas.

On submitting the coal to distillation in a coal-testing apparatus 10,500 cubic feet of gas were obtained, having an illuminating power equal to 17·3 standard sperm candles as ascertained by burning the gas at the rate of 5 cubic feet per hour in a photometer fitted with the No. 1 London Argand standard burner. The coal yielded the following percentage amounts of coke and volatile matters.

	Per cent.
Coke	68·0
Volatile matters	32·0
	100·0

The resulting coke was of good quality.

DURHAM.

Notes.

A complete "ultimate" analysis of the coal was made, and the following results were obtained :—

	Per cent.
Carbon	80·30
Hydrogen	4·87
Oxygen	7·17
Nitrogen	1·50
Sulphur	1·30
Ash	3·76
Water	1·10
	100·00

Analyst—John Pattinson.

Date of Analysis— . . . . . .

Colliery—SPRINGWELL, High Main and Maudlin Seams, Springwell Pit.

Shipping Port—Jarrow-on-Tyne.

Rail—North Eastern, Jarrow Station.

Canal— . . . . . .

Peareth Gas Coals.

Class of Coal—Gas.

On submitting the coal to distillation in a coal-testing apparatus 10,500 cubic feet of gas were obtained per ton of coal, having an illuminating power equal to 15·3 standard sperm candles as ascertained by burning the gas at the rate of 5 cubic feet per hour in a photometer fitted with the No. 1 London Argand standard burner. The coal yielded the following percentage amounts of coke and volatile matters :—

	Per cent.
Coke	69·2
Volatile matters	30·8
	100·0

A complete "ultimate" analysis of the coal was made, and the following results were obtained :—

	Per cent.
Carbon	82·04
Hydrogen	4·96
Oxygen	5·36
Nitrogen	1·74
Sulphur	1·10
Ash	3·36
Water	1·44
	100·00

Analysts—J. and H. S. Pattinson.

Date of Analysis—April 13, 1901.

Notes.

DURHAM.

Ravensworth Pelaw Gas Coal.

Class of Coal—Gas.

On submitting the coal to distillation in a coal-testing apparatus 10,500 cubic feet of gas were obtained per ton of coal, having an illuminating power equal to 15·1 standard sperm candles as ascertained by burning the gas at the rate of 5 cubic feet per hour in a photometer fitted with the No. 1 London Argand standard burner. The coke yielded the following percentage amounts of coke and volatile matters:—

	Per cent.
Coke	69·5
Volatile matters	30·5
	100·0

A complete "ultimate" analysis of the coal was made, and the following results were obtained:—

	Per cent.
Carbon	84·16
Hydrogen	5·00
Oxygen	4·18
Nitrogen	1·66
Sulphur	1·13
Ash	2·70
Water	1·17
	100·00

Analysts—J. and H. S. Pattinson.
Date of Analysis—April 13, 1901.

CARTERTHORNE COLLIERY COMPANY LIMITED,

Zetland Buildings, Middlesbrough.

Colliery—CARTERTHORNE, Main Seam, ... Pit.
Shipping Ports—Tyne Dock, West Hartlepool, Middlesbrough.
Rail—North Eastern, Evenwood Station.
Canal— . . . . . .

Carterthorne Gas Coal.

Class of Coal—Gas.

	Per cent.
Carbon	67·17
Volatile hydrocarbons .. .	27·73
Sulphur	1·05
Ash	2·25
Water	1·80
Yield of coke	69·95

Analysts—Pattinson and Stead.
Date of Analysis— . . . . . .

DURHAM.

Notes.

CONSETT IRON COMPANY LIMITED,

Blackhill, Co. Durham.

Colliery— . . . . . Brockwell, Three-quarter and Five-quarter Seams, ... Pit.

Shipping Ports—Dunston Staiths, Tyne Dock and Sunderland.

Rail— . . . . . Station.

Canal— . . . . . .

Original Caresfield Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal ..	10,500 cubic feet
Illuminating power .. .	16·1 candles
Coke	71·3 per cent.
Volatile matters	28·7 per cent.

Ultimate analysis:—	Per cent.
Carbon	82·88
Hydrogen	4·68
Oxygen	6·18
Nitrogen	1·24
Sulphur	0·61
Ash	3·36
Water	1·05

The coal giving this analysis was made up of 80 per cent. from the Brockwell seam, 12 per cent. from Three-quarter seam, and 8 per cent. from the Five-quarter Seam.

Analyst— . . . . . .

Date of Analysis— . . . . . .

EAST PONTOP COAL COMPANY LIMITED.

Annfield Plain, R.S.O.

Colliery— . . . . . Seam, ... Pit.

Shipping Ports—Tyne Dock, Sunderland.

Rail— . . . . . Station.

Canal— . . . . . .

East Pontop Gas Coals.

Class of Coal—Gas.

Yield of gas per ton of coal ..	10,500 cubic feet.
Illuminating power	17·8 standard sperm [candles
Coke	69·7 per cent.
Volatile matters	30·3 per cent.

Notes.

DURHAM.

East Pontop Gas Coals—*cont.*

Ultimate analysis :—	Per cent.
Carbon	84·49
Hydrogen	5·16
Oxygen	3·94
Nitrogen	1·62
Sulphur	1·26
Ash	2·30
Water	1·23

Analyst— . . . . . .
Date of Analysis— . . . . .

East Castle Small Coal.

Class of Coal— . . . . . .

	Per cent.
Carbon	65·19
Volatile matters	27·98
Ash	6·83

Analyst— . . . . . .
Date of Analysis— . . . .

FERENS & LOVE.

Durham.

Colliery—CORNSAY, ... Seam, ... Pit.
Shipping Ports—Tyne Dock and Sunderland.
Rail—North Eastern, Waterhouses Station.
Canal— . . . . . .

West Brancepeth Unscreened Coking Coal.

Class of Coal—Coking.

	Per cent.
Fixed carbon	72·0
Volatile matters	21·4
Ash	6·6
Sulphur	1·23
Coke	78·6
Moisture	1·2
Phosphorus in ash	0·0066
Ash	Grey.

Analyst—W. H. Blake.
Date of Analysis—February 6, 1904.

DURHAM.

Notes.

West Brancepeth Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal..	10,108 cubic feet.
Illuminating power	17·75 standard sperm candles.
Coke	73·90 per cent.
Volatile matters	26·10 per cent.

Ultimate analysis—

	Per cent.
Carbon	84·40
Hydrogen	5·18
Oxygen	4·74
Nitrogen	1·28
Sulphur	0·82
Ash	2·15
Water	1·43

Analyst—W. F. Keating Stock.

Date of Analysis—March 14, 1895.

HAMSTERLEY COLLIERY LIMITED,

Milburn House, Newcastle-on-Tyne.

Colliery—HAMSTERLEY, ... Seam, ... Pit.

Shipping Ports—Dunston and Tyne Dock.

Rail—North Eastern Railway, Ebchester Station.

Canal— . . . . . .

Hamsterley Coking Coal.

Class of Coal—Coking.

Sampled from wagons during shipment at Dunston Staiths, January 24, 1906.

	Per cent.
Fixed carbon	71·57
Volatile matters	25·50
Ash	2·93
Sulphur	0·71
Coke	74·50
Moisture	0·58
Ash	Light Red.

Analyst—W. H. Blake, F.C.S.

Date of Analysis—July 10, 1906.

Notes.

DURHAM.

HARTON COAL COMPANY LIMITED,

South Shields

Colliery—BOLDON, ... Seam, ... Pit.
Shipping Ports—Tyne Dock and private shipping places on River Tyne, and at Sunderland.
Rail—North Eastern, Brockley Whins Station.
Canal— . . . . . .

Boldon Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal	10,500 cubic feet.
Illuminating power	16·9 candles.
Coke	66·7 per cent.
Volatile matters	33·3 per cent.
	Per cent.
Carbon	82·36
Hydrogen	5·11
Oxygen	6·56
Nitrogen	1·05
Sulphur	0·86
Ash	2·04
Moisture	2·02

This coal (Boldon) is of repute as an excellent gas coal. It is sent freely to London and the east and the south coasts, and is a favourite coal with German, French, Italian and other gasworks.

Analyst—John Pattinson, F.I.C., F.C.S.
Date of Analysis— . . . . . .

THOS. HEDLEY & BROS.,

Maritime Buildings, Newcastle-on-Tyne.

Colliery—HOLMSIDE, Main Coal and Hutton Seams, Various Pits.
Shipping Ports—Tyne Dock (Tyne), and South Dock (Sunderland).
Rail—North Eastern, Craghead Station.
Canal— . . . . . .

Holmside Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal	10,500 cubic feet.
Illuminating power	17 standard sperm candles.
Coke	67·8 per cent.
Volatile matters	32·2 per cent.

Notes.

DURHAM.

	Per cent.
Carbon	82·04
Hydrogen	5·00
Oxygen	5·38
Nitrogen	1·36
Sulphur	1·52
Ash	3·36
Water	1·34

Analysts—J. and H. S. Pattinson.

Date of Analysis—February 21, 1902.

HETTON COAL COMPANY,

Hetton-le-Hole.

Colliery— . . . . . Seam, ... Pit.

Shipping Port—Sunderland.

Rail—North Eastern, Hetton Station.

Canal— . . . . .

Hetton Steam Coals.

Class of Coal—Steam.

	Per cent.
Carbon	81·11
Hydrogen	5·37
Oxygen / Nitrogen	7·74
Ash	2·80
Sulphur	0·90
Moisture	2·08

Calorific value of coal in Centigrade heat units (being pounds of water capable of being heated 0 to 1 deg. Cent. by 1 lb. of coal)=6,530.

Water evaporated from 212 deg. Fahr. by 1 lb. of the coal=13·5 lb.

Analyst— . . . . . .

Date of Analysis— . . . .

Notes.

DURHAM.

Hetton Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal	10,500 cubic feet.
Illuminating power	16·4 standard sperm candles.
Coke	65·2 per cent.
Volatile matters	34·8 per cent.
Complete ultimate analysis—	Per cent.
Carbon	77·07
Oxygen	11·85
Hydrogen	4·04
Nitrogen	1·04
Sulphur	1·28
Ash	2·44
Water	2·28

Analyst—John Pattinson, F.I.C., F.C.S.
Date of Analysis—1887.

HEWORTH COAL COMPANY LIMITED,

Watergate Buildings, Newcastle-on-Tyne.

Colliery—HEWORTH, Various Seams, John and Ada Pits.
Shipping Port—Private Staiths on River Tyne.
Rail— . . . . . Station.
Canal— . .

Dean's Primrose Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal	11,500 cubic feet.
Illuminating power	16·5 standard sperm candles.
Illuminating power expressed in sperm	650·6 lb.
Coke	67·3 per cent.
Volatile matters	32·7 per cent.
Ultimate analysis—	Per cent.
Carbon	81·82
Hydrogen	4·82
Oxygen	6·38
Nitrogen	1·64
Sulphur	0·87
Ash	2·84
Water	1·63
	100·00

Analysts—J. and H. S. Pattinson.
Date of Analysis—March 9, 1900.

DURHAM.

Notes.

HORDEN COLLIERIES LIMITED,

Crown Street Chambers, Darlington.

Colliery—HORDEN, Low Main Seam, ... Pit.

Shipping Ports—East and West Hartlepool, Seaham, South Dock, Tees, and Tyne.

Rail—North Eastern, ... Station.

Canal— . . . . . .

Horden Low Main Screened Coal.

Class of Coal—Steam.

I hereby certify that I have analysed the undermentioned sample of Horden Low Main screened coal received from the Horden Collieries Limited, December 21, and that I find as follows—

	Per cent
Fixed carbon	59·15
Volatile hydrocarbons	34·68
Ash	3·80
Sulphur	0·87
Moisture	1·50
	100·00

The absolute heating power of the sample when burnt under standard conditions in a Thompson's calorimeter is equal to the evaporation of 14·63 lb. of water from 212 deg. Fahr.

An examination of the ash shows that it is not liable to clinker with proper firing.

Analyst—W. F. Keating Stock.

Date of Analysis—December 23, 1905.

Colliery—HORDEN, No. 2 Seam, ... Pit.

No. 2 Seam Gas Coal.

Class of Coal—Gas.

	Per cent.
Fixed carbon	49·80
Volatile hydrocarbons	44·30
Ash	2·48
Sulphur	1·69
Moisture	1·73
	100·00
Yield of coke (absolute)	53·25
Ash in coke	4·65
Yield of purified gas per ton at standard temperature and pressure	12,879 cubic feet.
Illuminating power	21¼ standard sperm candles

Analyst—W. F. Keating Stock.

Date of Analysis—January 21, 1904.

Notes.

DURHAM.

Horden Hutton Seam.

Class of Coal—Gas.

Yield of gas per ton of coal..	11,415 cubic feet.
Illuminating power of the gas ..	16¾ standard sperm candles

These results were obtained on submitting the coal to distillation in a coal-testing apparatus and burning the gas so obtained at the rate of 5 cubic feet per hour in a photometer fitted with a No. 1 London standard Argand burner.

A chemical analysis of the coal gave as follows :—

	Per cent.
Fixed carbon	58·09
Volatile hydrocarbons ..	31·74
Ash	6·67
Sulphur	3·04
Moisture	0·46
	100·00
Absolute yield of coke	66·50
Ash in coke..	10·03

The sperm equivalent of this sample is 655 lb.

Analyst—W. F. Keating Stock.

Date of Analysis—August 6, 1904.

Colliery—HORDEN, Hutton Seam, ... Pit.

Horden Hutton Seam Coal (Working Test).

Class of Coal—Gas and Coking.

Specific gravity of coal (water as 1) ..	1·278
Weight of one cubic foot	79·87 lb.
Ash in coal	4·2 per cent.
Sulphur in coal	1·56 per cent.
Purified gas per ton of coal	10,712 cubic feet.
Purified gas per cubic foot of coal ..	381·9 cubic feet.
Illuminating power	16·95 candles.
Value of gas from 1 ton of coal	622·5 lb. sperm.
Value of 1 cubic foot of gas	406·8 grains sperm.
Weight of coke per ton of coal ..	1,496 lb.
Coke per ton of coal..	66·78 per cent.
Tar per ton of coal obtained to outlet of condensers..	10·25 gallons.
Ammoniacal liquor per ton of coal obtained to outlet of condensers	16·5 gallons.
Strength of ammoniacal liquor, degrees Twaddell	5·5 degs.

Analyst—Matt. Dunn, M.Inst.Mech.E.

Date of Analysis—June 20, 1905.

DURHAM.

Notes.

Colliery—HORDEN, Main Seam, ... Pit.

Horden Main Seam Coal.

Class of Coal—Coking and Gas.

	Per cent.
Fixed carbon	59·40
Volatile hydrocarbons	33·66
Ash	4·20
Sulphur	1·22
Moisture	1·52
	100·00
Yield of coke (absolute)	64·30
Ash in coke..	6·53
Sulphur in coke	1·08
Yield of purified gas per ton at standard temperature and pressure	12,373 cubic feet.
Illuminating power in standard sperm candles	15·25

Analyst—W. F. K. Stock.

Date of Analysis—February 10, 1904.

Colliery—SHOTTON, Hutton Seam, ... Pit.

Shotton Hutton Seam Coal.

Class of Coal—Coking.

	Per cent.
Fixed carbon	66·79
Volatile hydrocarbons	24·20
Ash	5·65
Sulphur	2·14
Moisture	1·22
	100·00
Yield of coke (absolute)	73·95
Ash in coke..	7·62
Yield of purified gas per ton at standard temperature and pressure	9,760 cubic feet.
Illuminating power in standard sperm candles	17·3

Analyst—W. F. K. Stock.

Date of Analysis—December 18, 1903.

Notes.

DURHAM.

Colliery—SHOTTON, Five-Quarter Seam, ... Pit.

Shotton Five-Quarter Seam Coal.

Class of Coal—Gas, Steam, Manufacturing and Coking.

	Per cent.
Fixed carbon	69·30
Volatile hydrocarbons	23·09
Ash	4·55
Sulphur	2·18
Moisture	0·88
	100·00
Yield of coke	75·40
Ash in coke..	6·03
Sulphur in coke	1·92
Yield of gas per ton of coal ..	10,416 cubic feet.
Illuminating power	14·50 standard sperm candles.
Light given by gas from 1 ton of coal when distilled	517·8 standard sperm [candles
Water capable of being evaporated by 1 lb. of coal	14·06 lb.

Analysts—Pattinson and Stead.

Date of Analysis—August 16, 1901.

LAMBTON COLLIERIES LIMITED,

Cathedral Buildings, Newcastle-on-Tyne.

Colliery— . . . . . Seam, ... Pit.

Shipping Ports—Lambton Staiths and Tyne Dock.

Rail— . . . . . Station.

Canal-- . . . . . .

Lambton Gas Coal.

Class of Coal—Gas.

Yield of gas per ton	11,000 cubic feet.
Illuminating power	14·9 standard candles.
Sperm value per ton	562 lb.
Yield of coke	68·0 per cent. = 13·6 cwt. per ton.

Proximate analysis—	Per cent.
Moisture	1·50
Ash	7·57
Volatile hydrocarbons	28·94
Fixed carbon	60·43
Sulphur	1·56
	100·00

Analyst—G. P. Lishman, D.Sc., F.I.C.

Date of Analysis—March, 1906.

DURHAM.

Notes.

Colliery— . . . . . Seam, ... Pit.

New Leverson's Gas Coal.

Class of Coal—Gas.

	Per cent.
Moisture	1·44
Ash	5·81
Volatile hydrocarbons	30·64
Fixed carbon	60·66
Sulphur	1·45
	100·00

Yield of gas per ton	11,000 cubic feet.
Illuminating power	15·2 candles.
Sperm value per ton	573 lb.
Yield of coke	66·5 per cent.

Analyst—G. P. Lishman, D.Sc., F.I.C.
Date of Analysis—1906.

Colliery— . . . . . Seam, ... Pit.

Lambton Washed Nuts.

Class of Coal— . . . . . .

Proximate analysis (air-dried)—

	Per cent.
Moisture	1·54
Ash	4·58
Volatile hydrocarbons	32·05
Fixed carbon	60·39
Sulphur	1·44
	100·00

Heating Value—

1 lb. coal raises	13,306 lb. water		1 deg. Fahr.=B.T.U.
1 lb. coal raises	73·9	,,	from 32 degs. to 212 degs. Fahr.
1 lb. coal raises	88·7	,,	,, 62 degs. to 212 degs. Fahr.
1 lb. coal raises	11·91	,,	,, 62 degs. to steam at 212 degs. Fahr.
1 lb. coal raises	13·76	,,	,, 212 degs. to steam at 212 degs. Fahr.=evaporative power.
1 lb. coal raises	7,388	,,	1 deg. Cent.=calorific value.

Analyst—G. P. Lishman, D.Sc., F.I.C.
Date of Analysis—March, 1906.

Notes.

DURHAM.

Colliery— . . . . . Seam, ... Pit.

Lambton Washed Duff.

Class of Coal— . . . . . .

Proximate analysis (air-dried)—	Per cent.
Moisture	1·71
Ash	5·33
Volatile hydrocarbons	30·56
Fixed carbon	60·75
Sulphur	1·65
	100·00

Heating value—

1 lb. coal raises 12,639 lb. water 1 deg. Fahr.=B.T.U.
1 lb. coal raises 70·2 ,, from 32 degs. to 212 degs. Fahr.
1 lb. coal raises 84·2 ,, ,, 62 degs. to 212 degs. Fahr.
1 lb. coal raises 11·31 ,, ,, 62 degs. to steam at 212 degs. Fahr.
1 lb. coal raises 13·07 ,, ,, 212 degs. to steam at 212 degs. Fahr. =evaporative power.
1 lb. coal raises 7,020 ,, 1 deg. Cent.=calorific value.

Analyst—G. P. Lishman, D.Sc., F.I.C.
Date of Analysis—March, 1906.

Colliery— . . . . . Seam, ... Pit.

Lambton Washed Peas.

Class of Coal— . . . . . .

Proximate analysis (air-dried)—	Per cent.
Moisture	1·52
Ash	4·41
Volatile hydrocarbons	31·14
Fixed carbon	61·47
Sulphur	1·46
	100·00

1 lb. coal raises 13,340 lb. water 1 deg. Fahr.=B.T.U.
1 lb. coal raises 74·1 ,, from 32 degs. to 212 degs. Fahr.
1 lb. coal raises 88·9 ,, ,, 62 degs. to 212 degs. Fahr.
1 lb. coal raises 11·94 ,, ,, 62 degs. to steam at 212 degs. Fahr.
1 lb. coal raises 13·79 ,, ,, 212 degs. to steam at 212 degs. Fahr. =evaporative power.
1 lb. coal raises 7,407 ,, 1 deg. Cent.=calorific value.

Analyst—G. P. Lishman, D.Sc., F.I.C.
Date of Analysis—March, 1906.

DURHAM.

Notes.

Colliery— . . . . . Seam, ... Pit.

Lambton Steam Coal.

Class of Coal—Steam.

	Per cent.
Carbon	81·00
Hydrogen	5·09
Oxygen	5·48
Nitrogen	1·62
Sulphur	1·14
Ash	4·12
Water	1·55
	100·00

Heating value—

1 lb. coal raises 13,247 lb. water 1 deg. Fahr. = B.T.U.
1 lb. coal raises 73·6 ,, from 32 degs. to 212 degs. Fahr.
1 lb. coal raises 88·3 ,, ,, 62 degs. to 212 degs. Fahr.
1 lb. coal raises 11·85 ,, ,, 62 degs. to steam at 212 degs. Fahr.
1 lb. coal raises 13·70 ,, ,, 212 degs. to steam at 212 degs. Fahr. = evaporative power.
1 lb. coal raises 7,349 ,, 1 deg. Cent. = calorific value.

Analyst—G. P. Lishman, D.Sc., F.I.C.
Date of Analysis—March, 1906.

Colliery— . . . . . Seam, ... Pit.

Lambton Duff.

Class of Coal— . . . . .

Proximate analysis—	Per cent.
Moisture	1·68
Ash	15·30
Volatile hydrocarbons	23·87
Fixed carbon	57·29
Sulphur	1·86
	100·00

Heating value—

1 lb. coal raises 10,939 lb. water from 32 degs. to 33 degs. Fahr. = B.T.U.
1 lb. coal raises 60·7 ,, ,, 32 degs. to 212 degs. Fahr.
1 lb. coal raises 72·9 ,, ,, 62 degs. to 212 degs. Fahr.
1 lb. coal raises 9·79 ,, ,, 62 degs. to steam at 212 degs. Fahr.
1 lb. coal raises 11·28 ,, ,, 212 degs. to steam at 212 degs. Fahr.
1 lb. coal raises 6,011 ,, 1 deg. Cent. = calorific value.

Analyst—G. P. Lishman, D.Sc., F.I.C.
Date of Analysis—March, 1906.

Notes.

DURHAM.

Colliery— . . . . . Seam, ... Pit.

Lambton Rough Small.

Class of Coal— . . . . . .

Proximate analysis—	Per cent.
Moisture	1·52
Ash	11·75
Volatile matters	27·11
Fixed carbon	57·85
Sulphur	1·77
	100·00

1 lb. coal raises 11,797 lb. water 1 deg. Fahr.=B.T.U.
1 lb. coal raises 65·5 ,, from 32 degs. to 212 degs. Fahr.
1 lb. coal raises 78·6 ,, ,, 62 degs. to 212 degs. Fahr.
1 lb. coal raises 10·56 ,, ,, 62 degs. to steam at 212 degs. Fahr.
1 lb. coal raises 12·2 ,, ,, 212 degs. to steam at 212 degs. Fahr.
1 lb. coal raises 6,553 ,, 1 deg. Cent.=calorific value.

Analyst—G. P. Lishman, D.Sc., F.I.C.
Dete of Analysis—March, 1906.

Colliery— . . . . . Seam, ... Pit.

Sherburn Unwashed Coals.

Class of Coal— . . . . . .

	Rough Small.	Peas and Duff.
Moisture	1·61	1·67
Ash	12·06	16·65
Volatile hydrocarbons.. ..	31·20	29·73
Fixed carbon	53·15	50·25
Sulphur	1·98	1·70
	100·00	100·00

	Rough Small. Lb.	Peas and Duff. Lb.
Water raised 1 deg. Fahr. by 1 lb. coal	12,260	11,101
Water raised from 32 degs. to 212 degs. Fahr. by 1 lb. coal	68·1	61·6
Water raised ,, 62 degs. to 212 degs. Fahr. by 1 lb. coal	81·7	74·0
Water raised ,, 62 degs. to steam at 212 F. by 1 lb. coal	10·97	9·93
Water raised ,, 212 degs. to steam at 212 F. by 1 lb. coal	12·67	11·48
Water raised 1 deg. Cent. by 1 lb. coal	6,807	6,169

Analyst—G. P. Lishman, D.Sc., F.I.C.
Date of Analysis—March, 1906.

DURHAM.

Notes.

Colliery— . . . . . Seam, . Pit.

Air-dried Sherburn Washed Coals.

Class of Coal— . . . .

	Nuts. Per cent.	Peas. Per cent.	Duff. Per cent.
Moisture	1·55	1·44	1·60
Ash	3·90	3·52	7·12
Volatile combustible matter	33·89	34·67	30·05
Fixed carbon	59·15	58·88	59·10
Sulphur	1·51	1·49	2·13
	100·00	100·00	100·00

	Nuts. Lb.	Peas. Lb.	Duff. Lb.
Water raised 1 deg. Fahr. by 1 lb. coal = B.T.U.	13,410	13,350	12,090
Water raised from 32 degs. to 212 degs. F. by 1 lb. coal	74·5	74·1	67·1
Water raised ,, 62 degs. to 212 degs. F. by 1 lb. coal	89·4	89·0	80·3
Water raised ,, 62 degs. to steam at 212 F. by 1 lb. coal	12·03	11·95	10·82
Water raised ,, 212 degs. to steam at 212 F. by 1 lb. coal	13·86	13·80	12·50
Water raised 1 deg. Cent. by 1 lb. coal	7,446	7,415	6,701

Analyst—G. P. Lishman, D.Sc., F.I.C.

Date of Analysis—March, 1906.

Colliery— . . . . . Seam, ... Pit.

Lambton Treble Nuts.

Class of Coal— . . . . . .

	Per cent.
Moisture	1·50
Ash	4·23
Volatile hydrocarbons	33·31
Fixed carbon	59·40
Sulphur	1·56
	100·00

Water raised 1 deg. Fahr. by 1 lb. coal = B.T.U.	13,209 lb.
Water raised from 32 degs. to 212 degs. Fahr. by 1 lb. coal	73·3 lb.
Water raised ,, 62 degs. to 212 degs. Fahr. by 1 lb. coal	88·0 lb.
Water raised ,, 62 degs. to steam at 212 F. by 1 lb. coal	11·82 lb.
Water raised ,, 212 degs. to steam at 212 F. by 1 lb. coal	13·66 lb.
Water raised 1 deg. Cent. by 1 lb. coal	7,335 lb.

Analyst—G. P. Lishman, D.Sc., F.I.C.

Date of Analysis—1906.

Notes.

DURHAM.

Colliery— . . . . . Seam, ... Pit.

Lambton Wallsend and Finchale Wallsend.

Class of Coal— . . . . . .

	Wallsend. Per cent.	Finchale Wallsend. Per cent.
Carbon	80·06	80·41
Hydrogen	5·21	5·11
Nitrogen	1·55	1·41
Oxygen	6·17	6·00
Moisture	1·66	1·47
Sulphur	1·45	1·38
Ash	3·90	4·22
	100·00	100·00

Analyst—G. P. Lishman, D.Sc., F.I.C.
Date of Analysis—1906.

Colliery— . . . . . Seam, ... Pit.
Shipping Port—Sunderland.

Sherburn Gas Coal.

Class of Coal—Gas.

Yield of gas per ton	11,000 cubic feet.
Illuminating power	14·5 sperm candles
Value of 1 ton coal in pounds sperm	547 lb.
Coke	69·8 per cent. = 13·9 cwt. per ton.

Proximate analysis—	Per cent.
Moisture	1·35
Ash	8·21
Volatile hydrocarbons	27·19
Fixed carbon	61·59
Sulphur	1·66
	100·00

Analyst—G. P. Lishman, D.Sc., F.I.C.
Date of Analysis—February 28, 1906.

DURHAM.

Notes.

LONDONDERRY COLLIERIES LIMITED,

Seaham Harbour.

Colliery—SEAHAM, Hutton and Maudlin Seams, Nos. 1, 2 and 3 Pits.
Shipping Ports—Seaham, per Dock Company's and own line; Sunderland, per North Eastern Railway.
Rail— . . . . . Station.
Canal— . . . . .

Londonderry Gas Coal.

Class of Coal—Gas.

On submitting the coal to distillation in a coal-testing apparatus, 11,000 cubic feet of gas were obtained per ton of coal, having an illuminating power equal to 17·2 standard sperm candles, as ascertained by burning the gas at the rate of 5 cubic feet per hour in a photometer fitted with the No. 1 London Argand standard burner. The illuminating value of the coal per ton expressed in terms of sperm is 649 lb. The coal yielded the following percentage amounts of coke and volatile matters.

	Per cent.
Non-volatile matters (coke)	65·3
Volatile matters, including water, expelled at a red heat in a closed vessel.. ..	34·7
	100·00

A complete "ultimate" analysis of the coal was made, and the following results were obtained:—

	Per cent.
Carbon	81·49
Hydrogen	5·25
Oxygen	6·22
Nitrogen	1·65
Sulphur	1·32
Ash	2·18
Water	1·89
	100·00

Analysts—J. and H. S. Pattinson.
Date of Analysis—April 30, 1903.

Notes.

DURHAM.

LOW BEECHBURN COAL COMPANY LIMITED,

Crook, R.S.O., Co. Durham.

Colliery—LOW BEECHBURN, Durham Hutton Seam, Low Beechburn Pit.

Shipping Ports—Sunderland, Tyne Dock and Middlesbrough.

Rail— . . . . . Station.

Canal— . . . . . .

Low Beechburn Unscreened Steam Coal.

Class of Coal—Steam.

	Per cent.
Fixed carbon	67·92
Volatile hydrocarbons ..	29·53
Ash	1·60
Sulphur	0·95

Analyst— . . . . . .

Date of Analysis—July, 1905.

Colliery—LOW BEECHBURN, Harvey Seam, Low Beechburn Pit.

Low Beechburn Gas Coal.

Class of Coal—Gas.

	Per cent.
Fixed carbon	66·97
Volatile hydrocarbons	27·87
Sulphur	1·15
Ash	2·55
Moisture	1·46
	100·00

Sulphur in ash	Trace
Yield of coke	70·31 per cent.
Yield of gas per ton of coal	9,632 cubic feet
Illuminating power of gas produced .	17·63 candles
Light given by gas from 1 ton of coal when distilled, equal to that from sperm	582·21 lb.

Analysis of coke—

	Per cent.
Carbon	95·07
Sulphur	1·13
Ash	3·80
	100·00

Analysts—Pattinson and Stead.

Date of Analysis—March 3, 1899.

Notes.

DURHAM.

NORTH BITCHBURN COAL COMPANY LIMITED,

Darlington.

Colliery— . . . . . Seam, Randolph Pit.
Shipping Ports—Middlesbrough, West Hartlepool, Tyne Dock.
Rail—North Eastern, Evenwood Station.
Canal— . . . . . .

Randolph Washed Single Nuts.

Class of Coal—Gas.

	Per cent.
Fixed carbon	62·32
Volatile hydrocarbons	31·32
Sulphur	0·41
Ash	4·35
Moisture	1·60
	100·00
Sulphur in ash	0·25
Yield of coke	67·00
Analysis of coke—	
Carbon	92·99
Sulphur	0·51
Ash	6·50
	100·00
Yield of gas per ton of coal	10,800 cubic feet
Illuminating power of gas	18·1 candles

Light given by gas from 1 ton of coal when distilled, equal to 670·2 lb. standard sperm candles.

Analysts—Pattinson and Stead.
Date of Analysis—July 12, 1894.

Wallsend Gas Coal.

Class of Coal—Gas.

	Per cent.
Fixed carbon	60·95
Volatile hydrocarbons	32·16
Ash	3·12
Sulphur	0·66
Moisture	3·11
	100·00

Notes.

DURHAM.

Wallsend Gas Coal—*cont.*

Yield of gas per ton in cubic feet at standard temperature and pressure	9,949 cubic feet
Illuminating power in standard sperm candles	16·63 candles
Yield of dry coke per ton	1,443·68 lb.
Ash in the coke ..	4·84 per cent.
Sulphur in coke	0·57 per cent.

Analyst—W. F. Keating Stock.

Date of Analysis—February 6, 1899.

NORTH BRANCEPETH COAL COMPANY LIMITED,

Darlington.

Colliery— . . . . . Hutton Seam, ... Pit.

Shipping Ports—Sunderland, Hartlepool, and Tyne Dock.

Rail— . . . . . Station.

Canal— .

North Brancepeth Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal..	10,752 cubic feet
Illuminating power	16·60 standard sperm candles
Value of 1 ton of coal in pounds sperm ..	611·9 lb.

Analysts—Pattinson and Stead.

Date of Analysis—September 27, 1892.

Colliery— . . . . . Busty Seam, ... Pit.

Littleburn (Busty Seam) Coal.

Class of Coal—Gas.

	Per cent.
Fixed carbon	65·33
Volatile hydrocarbons	27·73
Ash	5·30
Sulphur	0·78
Moisture	0·86

Analysts—Pattinson and Stead.

Date of Analysis—October 4, 1892.

DURHAM.

Notes.

PRIESTMAN COLLIERIES LIMITED,

Milburn House, Newcastle-on-Tyne.

Colliery—AXWELL GARESFIELD, ... Seam, Axwell Pit.

Shipping Ports—Dunston, Tyne Dock, and Sunderland.

Rail— . . . . . Swalwell Station.

Canal— . . . . . .

Axwell Garesfield Coal.

Class of Coal—Gas.

Ultimate analysis—	Per cent.
Carbon	82·53
Hydrogen	4·77
Oxygen	6·82
Nitrogen	1·37
Sulphur	0·73
Ash	2·70
Water	1·08
	100·00

On submitting the coal to distillation in a coal-testing apparatus, 10,500 cubic feet of gas were obtained per ton of coal, having an illuminating power equal to 16·4 standard sperm candles, as ascertained by burning the gas at the rate of 5 cubic feet per hour in a photometer fitted with the No. 1 London Argand standard burner.

The coal yielded the following percentage amounts of coke and volatile matters :—

	Per cent.
Coke	70·6
Volatile matters	29·4
	100·0

The resulting coke was of good quality.

The above results show that this is a good coal for gas-making purposes.

Analysts—J. and H. S. Pattinson.

Date of Analysis—September 5, 1892.

Notes.

DURHAM.

Collieries—WALDRIDGE, ... Seam, A., C. and D. Pits.
Shipping Ports—Dunston and Tyne Dock.
Rail— . . . . . Station.
Canal— . . . . . .

Waldridge Gas Coal.

Class of Coal—Gas.

Ultimate analysis—	Per cent.
Carbon	82·31
Hydrogen	4·96
Oxygen	5·07
Nitrogen	1·40
Sulphur	1·10
Ash	4·30
Water	0·86
	100·00

On submitting the coal to distillation in a coal-testing apparatus, 10,500 cubic feet of gas were obtained per ton of coal, having an illuminating power equal to 17·5 standard sperm candles, as ascertained by burning the gas at the rate of 5 cubic feet per hour in a photometer fitted with the No. 1 London Argand standard burner. The coal yielded the following percentage amounts of coke and volatile matters :—

	Per cent.
Coke	69·2
Volatile matters	30·8
	100·00

The resulting coke is of good quality.

The above results show that this is an excellent coal for gas-making purposes.

Analysts—J. and H. S. Pattinson.
Date of Analysis—April 17, 1894.

DURHAM.

Notes.

OWNERS OF REDHEUGH COLLIERY.

Gateshead-on-Tyne.

Colliery—REDHEUGH, ... Seam, ... Pit.

Shipping Ports—Dunston, Tyne Dock, Northumberland Dock, and South and North Blyth.

Rail— . . . . . Station.

Canal— . . . . . .

Redheugh Tanfield Coal.

Class of Coal—Gas, Coking.

Yield of gas per ton of coal..	10,500 cubic feet.
Illuminating power of gas in standard candles	14·1 candles
Coke per ton of coal	1,646 lb.
Appearance of coke	Good
	Per cent.
Coke	73·5
Volatile matters	26·5
	100·0
	Per cent.
Ash in coal	3·35
Sulphur in coal	0·56

Analyst—W. W. Proctor.

Date of Analysis—October 23, 1903.

Messrs. U. A. RITSON & SONS LIMITED,

Milburn House, Newcastle-on-Tyne.

Collieries—BURNHOPE and SOUTH PONTOP, . . . Seam, ... Pit.

Shipping Ports—Tyne Dock and Sunderland.

Rail— . . . . . Station.

Canal— . . . . . .

New Pelaw Gas Coal.

Class of Coal—Gas.

Ultimate analysis—	Per cent.
Carbon	83·45
Hydrogen	5·14
Oxygen	4·72
Nitrogen	1·32
Sulphur	1·11
Ash	3·10
Water	1·16
	100·00

Notes.

DURHAM.

New Pelaw Gas Coal—*cont.*

On submitting the coal to distillation in a coal-testing apparatus, 10,500 cubic feet of gas were obtained per ton of coal, having an illuminating power equal to 16·2 standard sperm candles, as ascertained by burning the gas at the rate of 5 cubic feet per hour in a photometer fitted with the No. 1 London Argand standard burner.

The illuminating value of the coal per ton expressed in pounds of sperm is 583.

The coal yielded the following percentage amounts of coke and volatile matters :—

	Per cent.
Non-volatile matters (coke)	69·4
Volatile matters, including water, expelled at a red heat in a closed vessel	30·6
	100·00

It coked well, giving a good hard clean coke.

The above results show that this is a good coal for gas-making purposes.

Analysts—J. and H. S. Pattinson.

Date of Analysis—February 22, 1905.

S. A. SADLER LIMITED,

Middlesbrough.

Colliery—ETHERLEY GRANGE, ... Seam, Woodhouses Pit.

Shipping Ports—Hartlepools, Sunderland, and Tyne Dock.

Rail—North-Eastern, West Auckland Station.

Canal— . . . . . .

Etherley Grange Gas Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

Yield of gas per ton of coal..	11,032 cubic feet
Illuminating power	18 candles
Value of 1 ton in sperm	681 lb.
Coke	13 cwt.
Ash	5·9 per cent.

Analyst— . . . . . .

Date of Analysis—December, 1903.

Notes.

DURHAM.

Etherley Grange Coking Coal.

Class of Coal—Coking.

	Per cent.
Volatile matters	29·73
Carbon	62·66
Ash	7·61

Analyst— . . . . . .

Date of Analysis— . . . . . .

Colliery—MALTON, ... Seam, ... Pit.

Hill Top Gas Coal.

Class of Coal—Gas, Steam, Manufacturing.

Yield of gas per ton of coal..	10,500 cubic feet
Illuminating power	17 sperm candles
Coke	70 per cent.
Volatile matters	29 per cent.
Ash	5·75 per cent.

Analyst—J. Preston.

Date of Analysis—February, 1904.

Malton Coking Coal.

Class of Coal—Coking.

	Per cent.
Volatile matter	21·15
Carbon	73·78
Ash	5·07

Analyst— . . . . . .

Date of Analysis— . . . . . .

Notes.

DURHAM.

SOUTH DERWENT COAL CO. LIMITED,

Annfield Plain, R.S.O.

Colliery—SOUTH DERWENT, ... Seam, South Derwent and West Shield Row Pits.

Shipping Ports—Dunston-on-Tyne, Tyne Dock and Sunderland.

Rail—North Eastern, Annfield Plain Station.

Canal— . . . . . .

West Pelaw Main Gas Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

Yield of gas per ton of coal	10,600 cubic feet
Illuminating power	16·5 sperm candles
Coke	67·7 per cent.
Volatile matters	32·3 per cent.

Ultimate analysis—	Per cent.
Carbon	80·73
Hydrogen	4·87
Oxygen	6·24
Nitrogen	1·68
Sulphur	19·1
Ash	3·40
Water	1·17

Analysts—J. and H. S. Pattinson.

Date of Analysis— . . . . . .

DURHAM.

Notes.

SOUTH HETTON COAL COMPANY LIMITED,

Sunderland.

Collieries—MURTON and SOUTH HETTON, Hutton Seam, ... Pit.

Shipping Ports—Sunderland and Seaham Harbour, &c.

Rail—North Eastern, South Hetton Colliery Sidings.

Canal— . . . . . .

Hutton Seam Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal..	10,500 cubic feet
Illuminating power	14·3 standard sperm candles
Coke	66·5 per cent.
Volatile matters	33·5 per cent.

Ultimate analysis—	Per cent.
Carbon	77·40
Hydrogen	4·31
Oxygen	9·42
Nitrogen	1·01
Sulphur	1·52
Ash	4·60
Water	1·74
	100·00

Analysts—J. and H. S. Pattinson.

Date of Analysis—1886.

Collieries—MURTON and SOUTH HETTON, Low Main Seam, ... Pit.

South Hetton Hartley Steam Coal.

Class of Coal—Steam.

	Per cent.
Carbon	81·82
Hydrogen	5·20
Oxygen	6·17
Nitrogen	1·65
Sulphur	0·88
Ash	2·20
Water	2·08
	100·00

Notes.

DURHAM.

South Hetton Hartley Steam Coal—*cont.*

	Per cent.
Non-volatile matters (coke, &c.)	66·0
Volatile matters	34·0

Calorific power:—Weight of water evaporated from 212 degs. Fahr. by 1 lb. of the coal as determined in Thomson's calorimeter, 14·9 lb.

Analysts—J. and H. S. Pattinson.
Date of Analysis—November 5, 1902.

OWNERS OF SOUTH PELAW COLLIERY,

Newcastle-on-Tyne.

Colliery—SOUTH PELAW, Busty Seam, South Pelaw Pit.
Shipping Ports—Tyne Dock and Sunderland.
Rail— . . . . . Station.
Canal— . . . . .

South Pelaw (Busty Seam) Gas Coal.

Class of Coal—Gas and Steam.

Yield of gas per ton of coal..	10,500 cubic feet
Illuminating power	16·0 candles
Coke (of good quality)	73·1 per cent.
Volatile matters	26·9 per cent.

	Per cent.
Carbon	80·40
Hydrogen	4·67
Oxygen	5·84
Nitrogen	1·41
Sulphur	1·27
Ash	5·35
Water	1·06
	100·00

Analysts—J. and H. S. Pattinson.
Date of Analysis—August 7, 1891.

DURHAM.

Notes.

Colliery—SOUTH PELAW, Low Main Seam, South Pelaw Pit.

South Pelaw (Low Main) Coal.

Class of Coal—Gas.

Yield of gas per ton of coal..	10,500 cubic feet
Illuminating power	16·3 standard sperm candles
Coke	68·7 per cent.
Volatile matters	31·3 per cent.

	Per cent.
Carbon	78·98
Hydrogen	4·71
Oxygen	7·39
Nitrogen	1·25
Sulphur	0·98
Ash	5·52
Water	1·17
	100·00

Analyst— . . . . . .

Date of Analysis— . . . .

Messrs. STRAKERS & LOVE,

Newcastle-on-Tyne.

Colliery—BRANDON, Hutton Seam, ... Pit.

Shipping Ports—Tyne Dock, South Dock, Sunderland, Middlesbrough Dock, and all north-east ports.

Rail— . . . . . Station.

Canal— . . .

Brandon (Hutton Seam) Gas Coal.

Class of Coal—Gas.

On submitting the coal to distillation in a coal-testing apparatus, 10,500 cubic feet of gas were obtained per ton of coal, having an illuminating power equal to 16·2 standard sperm candles, as ascertained by burning the gas at the rate of 5 cubic feet per hour, in a photometer fitted with the No. 1 London Argand standard burner.

The coal yielded the following percentage amounts of coke and volatile matters :—

	Per cent.
Coke	71·5
Volatile matters	28·5
	100·0

Notes.

DURHAM.

Brandon (Hutton Seam) Gas Coal—*cont.*

A complete "ultimate" analysis of the coal was made, and the following results were obtained:—

	Per cent.
Carbon	80·51
Hydrogen	4·80
Oxygen	6·82
Nitrogen	1·44
Sulphur	2·07
Ash	3·00
Water	1·36
	100·00

Analysts—J. and H. S. Pattinson.

Date of Analysis—January 12, 1901.

Colliery—BRANCEPETH, ... Seam, ... Pit.

Brancepeth Gas Coal.

Class of Coal—Gas.

Average analysis after a full year's test at Harrogate Gasworks.

Yield of gas per ton	10,800 cubic feet	
Illuminating power	16·2 candles	
Coke	70·0 per cent.	
Tar	383 tons	From about 8,600 tons of coal carbonised.
Sulphate of ammonia, and ammoniacal liquor, or equivalent of sulphur	52½ tons	

Analyst— . . . . . .

Date of Analysis— . . . . . .

Colliery—BRANCEPETH, Hutton Seam, ... Pit.

Brancepeth Gas Coal (Hutton Seam).

Class of Coal—Gas.

Yield of gas per ton	10,500 cubic feet
Illuminating power	16·2 candles
Coke	68·5 per cent.
Volatile matters	31·5 per cent.

	Per cent.
Carbon	77·56
Hydrogen	4·82
Oxygen	9·36
Nitrogen	1·55
Sulphur	1·90
Ash	3·33
Water	1·48

Notes.

DURHAM.

The following is interesting as being the mean result of actual working tests of the Brancepeth gas coal at Woolwich, so long ago as 1852 :—

Specific gravity of coal	1·275
Coke	72·5 per cent.
Volatile matter	26·5 per cent.
Coke per ton of coal	31 bushels (equal to about 10¼ cwt.)
Gas per ton of coal	9,600 cubic feet
Illuminating power of 5 cubic feet of this gas, equal to	12·7 standard candles
Sulphur in the coal	1·2 per cent.
Ash in the coal	2·2 per cent.

Analyst— . . . . . .
Date of Analysis— . . . . . .

Colliery—BRANCEPETH, ... Seam, ... Pit.

Brancepeth Cannel Coal.

Class of Coal—Gas.

Yield of gas per ton of coal..	11,500 cubic feet
Illuminating power	24 standard sperm candles
Coke	72·8 per cent.
Volatile matter	27·2 per cent.

	Per cent.
Carbon	74·51
Hydrogen	4·76
Oxygen	7·05
Nitrogen	0·67
Sulphur	0·56
Ash	12·06
Water	0·39
	100·00

Analyst— . . . . . .
Date of Analysis— . . . . . .

Notes.

DURHAM.

Colliery—BRANCEPETH, Busty Seam, ... Pit.

Brancepeth Busty Unscreened Coking Coals.

Class of Coal—Coking.

	Per cent.
Fixed carbon	67·31
Volatile hydrocarbons	25·61
Sulphur	0·78
Ash	5·10
Water	1·20
	100·00
Non-volatile matters (coke)	72·8
Volatile matters, including water, expelled at a temperature of 1,000 C. in a closed vessel	27·2
	100·00

Phosphorus	0·0035 per cent. on the coal.
Equivalent to	0·005 per cent. on the coke.

Analysts—J. and H. S. Pattinson.
Date of Analysis—September 11, 1906.

THRISLINGTON COAL COMPANY LIMITED,

West Cornforth.

Colliery—THRISLINGTON, Harvey and Busty Seams, Jane Pit.
Shipping Ports—Hartlepools, Sunderland and Middlesbrough.
Rail—North Eastern, West Cornforth Station.
Canal—*Nil.*

South Kelloe Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal..	10,640 cubic feet.
Illuminating power	17·90 standard sperm candles
Sperm value of 1 ton of coal	653 lb. sperm

Analyst— . . . . . .
Date of Analysis— . . . . . .

DURHAM.

Notes.

TRIMDON COAL COMPANY,

Trimdon Grange, R.S.O., Co. Durham.

Colliery—DEAF HILL, Harvey Seam, Deaf Hill Pit.

Shipping Ports—Hartlepools and Sunderland.

Rail—North Eastern, Trimdon Station.

Canal— . . . . . .

Deaf Hill Gas Coal.

Class of Coal—Gas and Manufacturing.

Test of coal under ordinary working conditions at the gasworks at West Hartlepool:—

Fixed carbon	62·81 per cent.
Ash	1·17 per cent.
Moisture	1·14 per cent.
Volatile matter (containing 0·98 sulphur)	34·88 per cent.
Purified gas per ton of coal	10,006 cubic feet
Illuminating power	16·9 sperm candles
Coke	14 cwt. 3 qr. = 1,652 lb.
Ash in coke	1·17 per cent.
Tar produced per ton of coal	9·8 gallons
Ammoniacal liquor	27·0 gallons
Sulphur contained in 100 cubic feet of gas after passing through lime purifier ..	5·31 grains

The same coal (Deaf Hill) chemically analysed, resulted as follows:—

	Per cent.
Fixed carbon	63·88
Volatile matters	31·37
Ash	2·87
Sulphur	0·82
Moisture	1·06

Yield of gas per ton of coal..	10,370 cubic feet
Illuminating power	17½ sperm candles
Equivalent of 1 ton of coal in pounds of sperm..	622 lb.
Coke	66·75 per cent.

Analyst— . . . . . .

Date of Analysis— . . . . . .

Notes.

DURHAM.

WALLSEND AND HEBBURN COAL COMPANY LIMITED,

Newcastle-on-Tyne.

Colliery—HEBBURN, Hutton Seam, Bensham Pit.
Shipping Port—Tyne, Private Staiths.
Rail—North Eastern, Jarrow and Hebburn Stations.
Canal— . . . . . .

Hebburn Main Gas Coal.

Class of Coal—Gas, Manufacturing.

Samples taken from three different parts of the mines.

Yield of gas per ton of coal	10,600 ..	10,800 ..	10,600 cubic feet
Illuminating power of gas	16·5 ..	17·0 ..	16·6 standard sperm candles

These results were obtained on submitting the coals to distillation in a coal-testing apparatus, and by burning the gas so obtained at the rate of 5 cubic feet per hour in a photometer fitted with the No. 1 London Argand standard burner.

The coals yielded the following percentage amounts of coke and volatile matters :

	Per cent.	Per cent.	Per cent.
Coke	69·5 ..	68·2 ..	70·1
Volatile matters	30·5 ..	31·8 ..	29·9
	100·0	100·0	100·0

All the coals coked well, and are good for gas-making purposes.

Analysts—J. and H. S. Pattinson.
Date of Analysis—August 7, 1900.

WASHINGTON COAL COMPANY LIMITED,

Washington, R.S.O.

Colliery— . . . . . Seam, ... Pit.
Shipping Port— . . . . . .
Rail— . . . . . Station.
Canal— . . . . . .

Washington Gas Coal.

Class of Coal—Gas.

The coal was submitted to distillation in a coal-testing apparatus at a temperature of 1,000 degs. Cent., and the gas yielded was measured. This gas was burnt in a photometer fitted with the No. 1 London Argand

Notes.

standard burner, at such a rate as to give the maximum efficiency of illumination; the illuminating power was determined, and the proportionate illuminating power at the standard rate of consumption of 5 cubic feet per hour was calculated from the result.

Yield of gas per ton of coal	11,400 cubic feet
Illuminating power of gas	15·1 standard sperm candles
Illuminating value of gas, expressed in sperm per ton of coal	590 lb.

The coal yielded the following percentage amounts of coke and volatile matters:—

	Per cent.
Coke	68·0
Volatile matters, including water, expelled at a temperature of 1,000 degs. Cent. in a closed vessel	32·0
	100·0

The coke was of good quality.

A complete ultimate analysis was made of the coal, and the following results were obtained:—

	Per cent.
Carbon	82·20
Hydrogen	5·18
Oxygen	4·81
Nitrogen	1·49
Sulphur	1·41
Ash	3·30
Water	1·61
	100·00

This is a good coal for gas-making purposes.

Analysts—J. and H. S. Pattinson.

Date of Analysis—November 9, 1905.

Washington Steam Coal.

Class of Coal—Steam.

A complete ultimate analysis was made, and showed the coal to contain:—

	Per cent.
Carbon	82·20
Hydrogen	5·18
Oxygen	4·81
Nitrogen	1·49
Sulphur	1·41
Ash	3·30
Water	1·61
	100·00

Notes.

DURHAM.

Washington Steam Coal—*cont.*

The coal yielded the following percentage amounts of coke and volatile matters:—

	Per cent.
Coke	68·0
Volatile matters, including water, expelled at a temperature of 1,000 degs. Cent. in a closed vessel	32·0
	100·0

The calorific value was determined and gave the following result:—

Pounds of water evaporated from 212 degs. Fahr. by 1 lb. of coal	15·3 lb.

This coal has high calorific value.

Analysts—J. and H. S. Pattinson.

Date of Analysis—November 9, 1905.

WEARDALE STEEL, COAL AND COKE COMPANY LIMITED,

Newcastle-on-Tyne.

Colliery— . . . . . Seam, ... Pit.

Shipping Ports—Hartlepools, Seaham Harbour and Sunderland.

Rail— . . . . . Station.

Canal— . . . . .

Thornley Gas Coals.

Class of Coal—Gas.

Yield of gas per ton of coal	10,500 cubic feet
Illuminating power	16·9 sperm candles
Coke	67·5 per cent.
Volatile matters	32·5 per cent.

	Per cent.
Carbon	83·24
Hydrogen	5·02
Oxygen	5·37
Nitrogen	1·70
Sulphur	0·58
Ash	2·73
Water	1·36

Analyst— . . . . . .

Date of Analysis— . . . . . .

Notes.

DURHAM.

Colliery— . . . . . Seam . . . . . Pit.
Shipping Ports—Tyne Dock and Sunderland.
Rail— . . . . . Station.
Canal— . . . . . .

Weardale Coking Coal.

Class of Coal—Coking.

	Per cent.
Carbon	83·84
Hydrogen	4·73
Oxygen	3·75
Nitrogen	1·31
Sulphur	0·84
Ash	4·20
Water	1·33
	100·00
Coke assay: –	
Coke	76·0
Volatile matters	24·0
	100·0

Analysts—J. and H. S. Pattinson.
Date of Analysis—December 6, 1901.

WEST MICKLEY COAL COMPANY LIMITED,

Newcastle-on-Tyne.

Colliery—ELTRINGHAM, ... Seam, West Mickley Pit.
Shipping Ports—Dunston, Tyne Dock, Commissioners' Staiths.
Rail— . . . . . Stocksfield Station.
Canal— . . . . . .

Tyne Boghead Cannel Coal.

Class of Coal—Gas, Locomotive, Steam.

	Works analysis. 1885.	1886.
Yield of gas per ton of coal	13,155	10,932 cubic feet
Gas from 1 cubic foot of coal	465·06	422·83 cubic feet
Value of gas from 1 ton of coal in pounds sperm	1,723·81	956·89 lb.
Illuminating power	38·22	25·53 candles
Tar per ton of coal	19·51	20·30 gallons
Ammoniacal liquor	1·72	11·26 gallons

Notes.

DURHAM.

Tyne Boghead Cannel Coal—*cont.*	Works analysis. 1885.	1886.
Strength of liquor	8·00	4·00 degs. Tw.
Coke per ton of coal	1,301·88	1,417·92 lb.
Carbon in coke	82·80	77·60 per cent.
Ash in coke	17·20	22·40 per cent.
Sulphur in coke	5·82	7·84 lb.
Heating power of 1 lb. coke (water from boiling point into steam)	11·37	10·65 lb.

The average of analyses at Cheltenham Gasworks in 1886, after many tests, gave the following particulars of the Tyne Boghead cannel coal:—

Yield of gas per ton of coal	11,700 cubic feet
Illuminating power	38·5 candles
Coke	11 cwt.

the manager (R. O. Patterson) adding:—"In my opinion it is superior to the best Lesmahagow; indeed, it is the richest cannel at present raised in any quantity in Great Britain."

Analyst— . . . . . .
Date of Analysis— . . . . . .

West Mickley Unscreened Gas Coals.

Class of Coal—Gas.

On submitting the coal to distillation in a coal-testing apparatus, 11,500 cubic feet of gas were obtained per ton of coal, having an illuminating power equal to 18·5 standard sperm candles as ascertained by burning the gas at the rate of 5 cubic feet per hour in a photometer fitted with the No. 1 London Argand standard burner.

The coal yielded the following percentage amounts of coke and volatile matters:—

	Per cent.
Coke	64·0
Volatile matters	36·0
	100·0

A complete "ultimate" analysis of the coal was made, and the following results were obtained:—

	Per cent.
Carbon	82·15
Hydrogen	4·91
Oxygen	6·56
Nitrogen	1·51
Sulphur	0·39
Ash	2·64
Water	1·84
	100·00

The above results show that this is a good coal for gas-making purposes.

Analysts—J. and H. S. Pattinson.
Date of Analysis—March 9, 1900.

DURHAM.

Notes.

OWNERS OF WEST STANLEY COLLIERY,

Newcastle-on-Tyne.

Colliery—WEST STANLEY, ... Seam, West Stanley Pit.

Shipping Ports—Sunderland, Tyne Dock, Blyth, Dunston, Howdon and Albert Edward Docks, and Commissioners' Spouts.

Rail— . . . . . Shield Row Station.

Canal— . . . . . .

North Pelton Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal..	11,723 cubic feet
Illuminating power	16·90 sperm candles
Coke	1,552·32 lb. = 64 per cent.
Ash in coke	1·74 per cent.
Sulphur in coke	0·85 per cent.

	Per cent.
Fixed carbon	68·10
Volatile hydrocarbons ..	28·59
Ash	1·20
Sulphur	1·18
Moisture	0·93

The following is the result of analysis of the same coal made eighteen years earlier than the above test:—

Yield of gas per ton of coal..	10,000 cubic feet
Illuminating power	16 sperm candles
Coke	70·5 per cent.
Volatile matters	29·5 per cent.

Complete ultimate analysis—	Per cent.
Carbon	84·38
Hydrogen	5·04
Oxygen	6·09
Nitrogen	0·93
Sulphur	0·94
Ash	1·58
Water	1·04

Analyst—W. F. Keating Stock.

Date of Analysis—May 2, 1894.

Notes.

DURHAM.

West Stanley Coking Coal.

Class of Coal—Coking.

	Per cent.
Fixed carbon	69·84
Volatile hydrocarbons	24·73
Ash	3·80
Sulphur	0·63
Moisture	1·00
	100·00

	Per cent.
Coke	74·00
Ash in coke..	5·13
Sulphur in coke	0·48
Phosphorus in coke	0·0055

Analyst—W. F. Keating Stock.
Date of Analysis—August 28, 1903.

OWNERS OF WINGATE GRANGE COLLIERY,

Wingate, R.S.O., Co. Durham.

Colliery—WINGATE GRANGE, ... Seam, ... Pit.
Shipping Ports—The Hartlepools, Wear, Tees and Tyne.
Rail— . . . . . Station.
Canal— . . . . . .

Harvey Seam Gas Coal.

Class of Coal—Gas.

Chemical analysis—	Per cent.
Fixed carbon	62·61
Ash	4·68
Moisture	1·17
Volatile matter (containing 1·74 of sulphur)	31·54
	100·00

Commercial analysis—	
Purified gas per ton of coal carbonised .	10,500 cubic feet
Illuminating power of gas	16·9 standard candles
Coke per ton of coal (after slacking) ..	1,635 lb.
Tar produced per ton of coal carbonised	9·75 gallons
Ammonia liquor per ton of coal 5 degs. Twad. (20 gallons of fresh water added per ton)	35·6 gallons
Sulphur contained in 100 cubic feet of gas after passing through purifiers	8·25 grains

Notes.

DURHAM.

The above results were obtained at the West Hartlepool Gasworks during a period of three consecutive days with 170 tons of unscreened Harvey coal. The coal was used under ordinary gas-producing circumstances, each charge being of six hours' duration. This coal was clean, newly mined, and in exceptionally good condition, being soft and friable, laminated in structure and having shining layers of bright soft coal with charcoal partings; it carbonised most freely.

Analyst—Thomas Bower, M.I.C.E.
Date of Analysis—May 5, 1902.

Notes.

GLOUCESTER.

THE BEDMINSTER, EASTON, KINGSWOOD AND PARKFIELD COLLIERIES LIMITED,

Easton Colliery, Bristol.

Colliery—PARKFIELD, ... Seam, Parkfield Pit.
Shipping Ports— . . . . . .
Rail— . . . . . Mangotsfield Station.
Canal— . . . . . .

Parkfield Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

	Per cent.
Volatile matter	37·90
Fixed carbon	57·90
Ash	4·20
	100·00

Coke .. 62·10 per cent.=12 cwt. 1 qr. 23 lb. per 1 ton of coal.

	Per cent.
Total sulphur	2·24
Moisture	1·92

Analysis of the coke—	Per cent.
Ash	6·76
Sulphur	1·42
Fixed carbon	91·82
	100·00

Specific gravity of coal	1,271 (water 1,000)
Yield of gas per ton of coal at standard pressure and temperature	11,090 cubic feet
Illuminating power of the gas by London Argand	16·4 candles
Value of 1 ton of coal in sperm	623·5 lb.

This is a very good gas coal, furnishing an excellent coke.

Analyst—Geo. R. Thompson.
Date of Analysis—July 15, 1904.

GLOUCESTER.

Notes.

Colliery—KINGSWOOD, Great Vein Seam, Kingswood Pit.
Shipping Ports—
Rail— Fishponds Station.
Canal—

Kingswood Steam Coal.

Class of Coal—Steam, Manufacturing, House.

	Per cent.
Carbon	81·82
Hydrogen	4·63
Oxygen	5·54
Nitrogen	1·39
Sulphur	0·92
Ash	4·10
Moisture	1·60
	100·00

	Per cent.
Coke	69·50
Fixed carbon	65·40
Volatile matter	30·50

Specific gravity of the coal	1,282 (water 1,000)
Value of the coal in calories	7,991 cal.
Evaporative power in pounds of water at 100 degs. Cent. per 1 lb. of coal	14·88 lb.

Analyst—Geo. R. Thompson.
Date of Analysis—July 15, 1904.

Mr. THOS. JOHNSON,

Prescott Street, Wigan.

Colliery—CROWN, Park End, Forest of Dean, ... Seam, ... Pit.
Shipping Ports—Lydney, Newport, Cardiff and Sharpness.
Rail—Great Western and Midland, Park End Station.
Canal— . . . . . .

Crown Seam Coal.

Class of Coal—Gas and House.

A sample of this coal, representing the entire product of the seam, received from the Crown Collieries, Park End, Forest of Dean, gave on examination the following results :

Notes.

GLOUCESTER.

Crown Steam Coal—*cont.*

	Per cent.
Chemical analysis—	
Water expelled at 212 degs. Fahr. ..	1·6
Volatile hydrocarbons	37·3
Fixed carbon	58·3
Ash	1·6
Sulphur	1·2
	100·0

Practical results—

Gas per ton of coal at 60 degs. F., and 30 in. bar.	13,500 cubic feet
Illuminating power of gas in standard candles	17 to 17½ candles.
Value of 1 cubic foot of gas in sperm	420 grains.
Value of gas in 1 ton of coal in sperm.. ..	810 lb.
Percentage of coke in coal	59·9 per cent.
Coke per ton of coal	1,341 lb.
Colour of ash	Light brown

The above coal yields a very large volume of gas of high illuminating power, and gives a good hard gas coke. The percentage of ash and sulphur in both coal and coke is low, and the small proportion of impurities in the coal renders the gas easy of purification.

Analyst—Wm. Jas. Orsman.

Date of Analysis—May 25, 1901.

Colliery—CROWN, ... Seam, ... Pit.

King Coal.

Class of Coal—Gas and House.

Practical results—

Gas per ton at 60 degs. F., and 30 in. bar.	13,100 cubic feet
Illuminating power	18·5 candles
Value of 1 cubic foot in sperm . ..	444 grains
Value of gas from 1 ton of coal in sperm	830 lb.

Liquid products—

Tar, per ton	12 gallons
Ammoniacal liquor per ton..	20 gallons
Strength of ammoniacal liquor	3 degrees

Solid products—

Coke, per ton	1,320 lb.
Ash, per ton	142 lb.

Notes.

GLOUCESTER.

Percentage composition—	Per cent.
Coke	58·9
Ash	6·2
Tar	6·3
Ammonia	1·6
Sulphur	1·3
Water expelled at 212 degs. Fahr.	1·4
Gas	24·3
	100·0

The volume of gas obtained from the above coal is very large and readily given off by the coal, and has a high illuminating power.

The coke is of good quality and of a light brown colour; it contains a very small percentage of ash, making the same very valuable.

Analyst—J. W. Wynne.

Date of Analysis— . . . . . .

Colliery—CROWN, ... Seam, ... Pit.

Best Double Screened Gas Coal.

Class of Coal—Gas and House.

Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	12,730 cubic feet.
Illuminating power of gas in standard candles	20·5 candles
Value of 1 cubic foot of gas in sperm	425 grains
Value of gas from 1 ton of coal in sperm	820 lb.
Coke per ton of coal	1,345 lb.
Colour of ash	Light brown

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr.	1·6
Volatile hydrocarbons	37·3
Fixed carbon	58·3
Ash	1·6
Sulphur	1·2
	100·0

The above coal yields a very large volume of gas of very high illuminating power, and gives a splendid coke very bright and clean. The percentage of ash and sulphur in both coke and coal is extremely low, and the small proportion of impurities in the coal renders the gas very easy of purification.

The foregoing results have been gained by a bench of four retorts on Drake's patent tube regenerators, and the engine worked at 1 in. vacuum. The coal burns off well in 4½ hours.

Analyst—J. T. Wynne.

Date of Analysis— . . . . . .

Notes.

GLOUCESTER.

LYDNEY AND CRUMP MEADOW COLLIERIES COMPANY LIMITED,

Cinderford, Forest of Dean.

Colliery—CRUMPMEADOW, Churchway High Delf Seam, No. 3 Pit.

Shipping Ports—Lydney, Sharpness, Newport, Cardiff.

Rail—Great Western and Severn and Wye Joint, Cinderford Station.

Canal—*Nil.*

Crump Meadow "Churchway High Delf" Coal.

Class of Coal—Gas, House and Steam.

	Per cent.
Carbon	77·72
Hydrogen	4·59
Nitrogen	1·67
Oxygen	5·61
Sulphur	2·23
Ash	4·55
Moisture	3·63
	100·00

Evaporative power as given by Thomson's calorimeter:
1 lb. of the coal equals 13·5 lb. of water at 100 degs. Cent.
Calorific power of the coal equals 7,670 calories.

As a steam coal I consider it well up to the average South Wales coals, as its evaporative power is over 13 lb. of water, and the absence of tendency to clinker is greatly in its favour.

Analyst—G. R. Thompson.

Date of Analysis—1896.

Crump Meadow Churchway High Delf Rubble Coal.

Class of Coal—Gas, House and Coking.

Specific gravity of the coal	1·269
Purified gas per ton of coal	9,825 cubic feet
Illuminating power of the gas	15·45 candles
Durability of 1 cubic foot by 5 in. jet flame	32 minutes
Coke per ton of coal (dry)	13¼ cwt.
Ash in coke	8 per cent.
1 cwt. of shell lime purifies	10,100 cubic feet of gas
Tar per ton of coal	10 gallons
Ammoniacal liquor	15 gals. 4·10 degs. Twad.
Moisture expelled from coal at 212 degs. F.	2·70 per cent.
Volatile matter in the coal	35 per cent.
Solid products in the coal	65 per cent.

Above results were obtained in ordinary working with generator furnaces, no exhauster, and 3 in. of back pressure. The coke is hard and compact, and will stand transit well.

Analyst—Jas. Robb.

Date of Analysis—May 31, 1906.

GLOUCESTER.

Notes.

Crump Meadow Starkey Rubble Coal.

Class of Coal—Gas, House and Coking.

Specific gravity of the coal	1·271
Purified gas per ton of coal	10,500 cubic feet
Illuminating power of gas	16·75 candles
Durability of 1 cubic foot by 5 in. jet flame	38 minutes
Coke per ton of coal (dry)	12½ cwt.
Ash in coke	3·89 per cent.
1 cwt. of shell lime purifies..	8,900 cubic feet of gas
Tar per ton of coal	10 gallons
Ammoniacal liquor per ton of coal ..	13 gals. 4·90 degs. Twad.
Moisture expelled from coal at 212 degs. F.	2·00 per cent.
Volatile matter in the coal	38·57 per cent.
Solid products	61·43 per cent.

Above results were obtained in ordinary working with generator furnaces, no exhauster, and 3 in. of back pressure. The coke is of good domestic quality, high heating value, and will command a ready sale.

Analyst—Jas. Robb.

Date of Analysis—May 31, 1906.

PARKEND DEEP NAVIGATION COLLIERIES LIMITED,

Lydney.

Colliery—PARKEND, Smiths Seam, Parkend and New Fancy Pits.

Shipping Ports—Lydney, Sharpness, Newport (Mon).

Rail—Severn and Wye Joint, Parkend and New Fancy Colliery Stations.

Canal— . . . . . .

Parkend House Coal.

Class of Coal—House.

Specific gravity of the coal, 1,285 (water being 1,000).

Fixed products or coke, 12 cwt. 8 lb.

The quantity of purified gas per ton at 30 in. bar. and 60 degs. Fahr. was 9,956 cubic feet.

The illuminating power of the gas when burned in "Sugg's London Argand," at a rate of 5 cubic feet per hour, was equal to the light of 15·88 spermaceti candles, each consuming 120 grains per hour.

Value of one ton of the coal in pounds of sperm, 542 lb.

Notes.

GLOUCESTER.

Parkend House Coal—*cont.*

The heating power of the coal is 13·33, or 1 lb. of this coal by its perfect combustion will convert 13·33 lb. of boiling water into steam.

Ultimate analysis:—	Per cent.
Carbon	78·06
Hydrogen	5·24
Oxygen	10·40
Nitrogen	0·47
Sulphur	1·44
Ash	4·39
	100·00

Analyst—Alex. H. Fiddes.

Date of Analysis—March, 1887.

PARK IRON ORE AND COAL COMPANY LIMITED,

Lydney.

Colliery—NORCHARD, ... Seam, ... Pit.

Shipping Ports—Lydney, Sharpness, Newport and Cardiff.

Rail—Severn and Wye Joint, Colliery Sidings, Lydney Station.

Canal— . . . . . .

Trenchard Lydney Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal..	11,125 cubic feet.
Illuminating power	16·77 standard candles.
Value of 1 cubic foot of gas in grains of sperm	402 grains.
Value of gas per ton of coal in lb. of sperm	567 lb.
Yield of coke per ton of coal	1,419 lb.
Ash in coal per cent.	4·8 per cent.
Sulphur in coal	1·271 per cent.

Analyst—G. R. Thompson.

Date of Analysis— . . . . . .

GLOUCESTER.

Notes.

Colliery—NORCHARD, ... Seam, Trenchard Pit.

Trenchard Gas, Steam and House Coal.

Class of Coal—Gas, Steam and House.

	Per cent.
Carbon	79·09
Hydrogen	4·76
Oxygen	4·70
Nitrogen	1·80
Sulphur	2·17
Water	2·08
Ash	5·40
	100·00

The ash is of good red colour, and does not show any great tendency to clinker. The yield of coke per 1 ton of coal is 14 cwt. 94 lb., or 74·2 per cent., and the total volatile matter amounts to 25·8 per cent. The coke is hard, porous and metallic looking, and contains 1·58 per cent. of sulphur. The calculated calorific value of the sample is 7,883 calories per 1 lb. of coal, and the evaporative power as obtained by Thomson's calorimeter is 14·6 lb. of water per 1 lb. of coal. From a practical test of the gas yield of the coal, it is found that 1 ton of the coal produces 11,125 cubic feet of purified gas, corrected to standard pressure and temperature. The illuminating power of this purified gas, as taken by the London Argand burner, equals 14·65 candles. The specific gravity of the coal is 1·31 (water = 1·00).

Analyst—G. R. Thompson.

Date of Analysis—October 13, 1898.

The following test was recently carried out with Trenchard small coal (passed through a 2 in. riddle jigger screen), consumed under a Lancashire boiler at the Bristol Corporation Electricity Works.

Size of boiler	28 ft. by 8 ft., flues 3 ft. 2 in.
Kind of stoker	Vicar's mechanical.
Heating surface	1,007 square ft.
Grate area	30·2 square ft.
Duration of trial	6 hours.
Mean boiler pressure	121 lb. per square in.
Total weight of fuel fired	3,870 lb.
Total weight of ash and unconsumed combustible	616 lb.
Percentage of ash to fuel fired	15 per cent.
Fuel burnt per square ft. of grate per hour	21·3 lb.
Fuel burnt per hour	645 lb.

Notes.

GLOUCESTER.

Trenchard Small Coal—*cont.*

Total weight of water evaporated	26,400 lb.
Water evaporated per hour..	4,400 lb.
Mean temperature of feed water	62 Fahr.
Pounds of water evaporated per pound of fuel..	6·87 lb.
Pounds of water evaporated per pound of fuel from and at 212 Fahr.	8·24 lb.
Superheat of steam leaving boiler ..	Saturated.
Draught in side flues	0·59 in. of water.
CO_2 in flue gases	8·8 per cent.

General remarks:—A free burning strong coal, easily worked, has given excellent results.

Colliery—NORCHARD, ... Seam, High Delf Pit.

High Delf Lydney Coal.

Class of Coal—Steam and Gas.

Yield of gas per ton of coal	9,215 cubic feet
Illuminating power	15·46 standard candles
Carbonic acid	10·3 per cent.
Hydrocarbons absorbed by bromine	4·75 per cent.

Analyst—G. R. Thompson.

Date of Analysis— . . . . .

PRINCESS ROYAL COLLIERY COMPANY LIMITED,

Bream, Lydney.

Colliery—FLOUR MILL, Coleford High Delf Seam,

. . . . . Pit.

Shipping Ports—Lydney and Sharpness.

Rail—Severn and Wye Joint, own Sidings, Whitecroft Station.

Canal— . . . . . .

Coleford High Delf Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal	9,700 cubic feet
Illuminating power	17·46 standard candles
Value of 1 cubic foot of gas in grains of sperm	419 grains
Value of gas from 1 ton of coal in sperm ..	580 lb.
Yield of coke per ton of coal	1,428 lb.
Ash in coal per cent.	3·02 per cent.
Sulphur in coal	2·062 per cent.

Analyst—J. S. Rowlands.

Date of Analysis—December 26, 1893.

GLOUCESTER.

Notes.

Coleford High Delf Seam, Gas Coal.

Class of Coal—Gas.

Specific gravity (water 1·000)	1·320
The quantity of purified gas per ton, at 30 in. bar. and 60 degs. Fahr., was	10,870 cubic feet
Sulphuretted hydrogen	0·42 per cent.
Carbonic acid	1·32 per cent.
The illuminating power of the gas by London standard Argand burner, consuming 5 cubic feet of gas per hour, is equal to .. .. .. (Each consuming 120 grains per hour).	15·6 std. sp. candles
Fixed products (coke)	59·60 per cent.
Volatile	40·40 per cent.
Sulphur in coal	0·82 per cent.
Ash	3 07 per cent.

Analyst—J. S. Rowlands.

Date of Analysis—December 26, 1903.

Coleford High Delf Seam, Steam Coal.

Class of Coal—Steam.

	Per cent.
Carbon	79·64
Hydrogen	5·30
Nitrogen	1·21
Oxygen	8·50
Sulphur	0·88
Ash	4·04
Water	0·40
	99·97

Analyst—J. S. Rowlands.

Date of Analysis—December 26, 1893.

Colliery—PARK GATE, Yorkley Seam, ... Pit.

Yorkley Seam Coal.

Class of Coal—Gas.

Specific gravity (water 1·000)	1·320
Quantity of purified gas per ton, at 30 in. bar. and 60 degs. Fahr.	10,340 cubic feet
Sulphuretted hydrogen	0·85 per cent.
Carbonic acid	1·50 per cent.

Notes.

GLOUCESTER.

Yorkley Seam Coal—*cont.*

Illuminating power of the gas by London standard Argand burner, consuming 5 cubic feet of gas per hour, equal to .. .. (Each consuming 120 grains per hour).	15·4 std. sperm candles
Fixed products (coke)	63·25 per cent.
Volatile do.	36·75 per cent.
Sulphur in coal	2·41 per cent.
Ash	4·50 per cent.

Analyst—J. S. Rowlands.

Date of Analysis—July 1, 1903.

TRAFALGAR COLLIERY COMPANY LIMITED,

Drybrook.

Colliery—TRAFALGAR, Five Seams at Trafalgar Pit, as below.

Shipping Port—Lydney.

Rail—Midland and Great Western Joint, Drybrook Road Station.

Canal—Berkeley.

Smith Coal.

Class of Coal—House.

Specific gravity of coal (water as 1,000) ..	1,284
Weight of 1 cubic foot in pounds	80·25 lb.
Yield of gas per ton of 2,240 lb. at a temperature of 60 degs. Fahr., the barometer at 30 in.	10,100 cubic feet
The illuminating power of the gas by a London standard Argand burner	14·9 std. sperm candles
The illuminating matter contained in the gas obtained from 20 cwt. of the coal . ..	515·9 lb. sperm
Coke, red hot, per ton .. .. cwt. qrs. lb.	12 3 24
Coke, slacked out, per ton .. cwt. qrs. lb.	15 1 6
Ammoniacal per ton .. .. gals. qts. pts.	13 1 1
Specific gravity	$4\frac{1}{2}$ degs. Twad., or 1,022
Tar	11 1 0
Specific gravity	30 degs. Twad., or 1,150

	Per cent.
Carbon in coal	78·12
Ash in coal	5·49
Sulphur in coal	1·64
Oxygen in coal	7·96
Hydrogen in coal	5·23
Nitrogen in coal	1·56
	100·00

GLOUCESTER.

Notes.

"Absolute" calorific value and evaporating power represented in pounds of water at 212 degs. Fahr., capable of being converted into steam by the thorough combustion of 1 lb. of the coal	14·1 lb.

Analyst—Robert J. Tootill.

Date of Analysis—January 7, 1890.

Lowery Coal.

Class of Coal—House.

Specific gravity of coal (water as 1,000) ..	1,268
Weight of 1 cubic foot	79·25 lb.
Yield of gas per ton of 2,240 lb. at a temperature of 60 degs. Fahr., the barometer at 30 in.	10,760 cubic feet
The illuminating power of the gas by a London standard Argand burner	15·4 std. sperm candles
The illuminating matter contained in the gas obtained from 20 cwt. of the coal	568·12 lb. sperm
Coke, red hot, per ton .. .. cwt. qrs. lb.	12 1 16
Coke, slacked out, per ton .. cwt. qrs. lb.	14 2 19
Ammoniacal liquor per ton ..gals. qts. pts.	13 3 0
Specific gravity	4¼ degs. Twad., or 1,021
Tar	11 0 0
Specific gravity	30 degs. Twad., or 1,150

	Per cent.
Carbon in coal	78·50
Ash	4·78
Sulphur	1·80
Oxygen	8·01
Hydrogen	4·92
Nitrogen	1·99
	100·00

"Absolute" calorific value and evaporating power represented in pounds of water at 212 degs. Fahr. capable of being converted into steam by the thorough combustion of 1 lb. of the coal	14·75 lb.

Analyst—Robert J. Tootill.

Date of Analysis—January 7, 1890.

Notes.

GLOUCESTER.

Starkey Coal.

Class of Coal—House.

Specific gravity of coal (water as 1,000) ..	1,276
Weight of 1 cubic foot	79·75 lb.
Yield of gas per ton of 2,240 lb. at a temperature of 60 degs. Fahr., the barometer at 30 in.	10,900 cubic feet
The illuminating power of the gas by a London standard Argand burner	15·2 st. sperm candles
The illuminating matter contained in the gas obtained from 20 cwt. of the coal	569·75 lb. sperm
Coke, red hot, per ton .. .. cwt. qrs. lb.	12 2 27
Coke, slacked out, per ton .. cwt. qrs. lb.	14 3 26
Ammoniacal liquor per ton ..gals. qts. pts.	12 3 1
Specific gravity	4 degs. Tw., or 1,020
Tar	12 1 0
Specific gravity	30½ degs. Tw., or 1,152

	Per cent.
Carbon in coal	78·3
Ash in coal	4·9
Sulphur in coal	1·6
Oxygen in coal	7·9
Hydrogen in coal	5·1
Nitrogen	2·2
	100·0

"Absolute" calorific value and evaporating power represented in pounds of water at 212 degs. Fahr. capable of being converted into steam by the thorough combustion of 1 lb. of the coal	14·9 lb.

Analyst—Robert J. Tootill.

Date of Analysis—January 7, 1890.

GLOUCESTER.

Notes.

Rocky Coal.

Class of Coal—House.

Specific gravity of coal (water as 1,000) ..	1,275
Weight of 1 cubic foot	79·6 lb.
Yield of gas per ton of 2,240 lb. at a temperature of 60 degs. Fahr., the barometer at 30 in.	11,250 cubic feet
The illuminating power of the gas by a London standard Argand burner	16·0 st. sperm candles
The illuminating matter contained in the gas obtained from 20 cwt. of the coal	610·6 lb. sperm
Coke, red hot, per ton .. .. cwt. qrs. lb.	12 3 6
Coke, slacked out, per ton .. cwt. qrs. lb.	15 2 19
Ammoniacal liquor per ton .. gals. qts. pts.	14 0 0
Specific gravity	3¼ degs. Tw., or 1,018
Tar	12 0 0
Specific gravity	29 degs. Tw., or 1,145

	Per cent.
Carbon in coal	80·55
Ash in coal	3·16
Sulphur in coal	0·91
Oxygen in coal	8·40
Hydrogen in coal	5·30
Nitrogen in coal	1·68
	100·00

"Absolute" calorific value and evaporating power represented in pounds of water at 212 degs. Fahr., capable of being converted into steam by the thorough combustion of 1 lb. of the coal	15·4 lb.

Analyst—Robert J. Tootill.

Date of Analysis—January 7, 1890.

Notes.

GLOUCESTER.

Churchway High Delf Coal.

Class of Coal—House.

Specific gravity of coal (water as 1,000) ..	1,280
Weight of 1 cubic foot	80 lb.
Yield of gas per ton of 2,240 lb. at a temperature of 60 degs. Fahr., the barometer at 30 in.	11,100 cubic feet
The illuminating power of the gas by a London standard Argand burner	15·6 std. sperm candles
The illuminating matter contained in the gas obtained from 20 cwt. of the coal	593·7 lb. sperm
Coke, red hot, per ton .. .. cwt. qrs. lb.	13 0 5
Coke, slacked out, per ton .. cwt. qrs. lb.	16 1 0
Ammoniacal liquor per ton .. gals. qts. pts.	13 2 0
Specific gravity	4 degs. Twad., or 1,020
Tar	11 2 0
Specific gravity	31 degs. Twad., or 1,155

	Per cent.
Carbon in coal	79·0
Ash in coal	4·5
Sulphur in coal	1·5
Oxygen in coal	8·2
Hydrogen in coal	5·0
Nitrogen in coal	1·8
	100·0

"Absolute" calorific value and evaporating power represented in pounds of water at 212 degs. Fahr., capable of being converted into steam by the thorough combustion of 1 lb. of the coal	15·2 lb.

Analyst—Robert J. Tootill.

Date of Analysis—January 7, 1890.

Notes.

LANCASHIRE.

ABRAM COAL COMPANY LIMITED,

Bickershaw, Wigan.

Colliery—ABRAM, Wigan Four Feet Seam, No. 2 Pit.

Shipping Ports—Garston, Hartington, Runcorn, High Level, Preston, Widnes, Herculaneum Dock.

Rail—L. and N. W. and Gt. Central, Abram Colliery Sidings.

Canal—Leeds and Liverpool, Plank Lane Tip.

Wigan Four-feet Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

Yield of gas per ton of coal	10,250 cubic feet
Specific gravity of coal	1,270
Condensation by bromine	3·75 per cent.
Illuminating power	15·62 standard candles
Value of 1 cubic foot	375 grains sperm
Value of gas per ton of coal	549 lb. sperm
Gas purified by 1 cwt. of lime	11,000 cubic feet
Yield of coke per ton of coal	1,307 lb.
Ash in coke..	5·66 per cent.

Analyst—Ralph Betley.

Date of Analysis— . . . . . .

Colliery—ABRAM, Wigan Five Feet Seam, No. 2 Pit.

Wigan Five-feet Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

Yield of gas per ton of coal	11,000 cubic feet
Specific gravity of coal	1,276
Condensation by bromine	3·50 per cent.
Illuminating power	14 standard candles
Value of 1 cubic foot	336 grains sperm
Value of gas per ton of coal	532·8 lb. sperm
Gas purified by 1 cwt. of lime	13,000 cubic feet
Yield of coke per ton of coal	1,315 lb.
Ash in coke..	7·05 per cent.

Analyst—Ralph Betley.

Date of Analysis— . . . . . .

Notes.

LANCASHIRE.

Colliery—ABRAM, Wigan Six-feet Seam, No. 5 Pit.

Wigan Six-feet Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

Yield of gas per ton of coal	10,500 cubic feet
Specific gravity of coal	1,235
Condensation by bromine	3·75 per cent.
Illuminating power	15·76 standard candles
Value of 1 cubic foot	378 grains sperm
Value of gas per ton of coal	567·36 lb. sperm
Gas purified by 1 cwt. lime	12,000 cubic feet
Yield of coke per ton of coal	1,361 lb.
Ash in coke	6·88 per cent.

Analyst—Ralph Betley.

Date of Analysis— . . . . . .

Colliery—ABRAM, Arley Seam, No. 5 Pit.

Arley Mine Gas Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

Yield of gas per ton of coal	12,353 cubic feet
Specific gravity of coal	1,275
Condensation by bromine	5·25
Illuminating power	18·51 standard candles
Value of 1 cubic foot	444·24 grains sperm
Value of gas per ton of coal	783·95 lb. sperm
Gas purified by 1 cwt. lime	15,000 cubic feet
Yield of coke per ton of coal	1,463 lb.
Ash in coke	3·20 per cent.

Analyst—Geo. R. Hislop, F.C.S., etc.

Date of Analysis— . . . .

LANCASHIRE.

Notes.

Colliery—ABRAM, Haigh Yard Mine Seam, No. 5 Pit.

Orrell Five Feet Coal.

Class of Coal—Steam.

Yield of gas per ton of coal	11,575 cubic feet
Specific gravity of coal	1,284
Condensation by bromine	6·00 per cent.
Illuminating power	20·7 candles
Value of 1 cubic foot	497·04 grains sperm
Value of gas per ton of coal	821·89 lb.
Yield of coke per ton of coal	1,409·63 lb.
Ash in coke	5·80 lb.

Analyst—Geo. R. Hislop, F.C.S., etc.

Date of Analysis— . . . . . .

Colliery—ABRAM, Wigan Four Feet Seam, No. 5 Pit.

Abram New Boghead Cannel.

Class of Coal—Gas.

Yield of gas per ton of coal	16,680 cubic feet
Specific gravity of coal	1,116
Condensation by bromine	18·80 per cent.
Illuminating power	42·46 candles
Value of 1 cubic foot	1,019·4 grains
Value of gas per ton of coal	2,428·22 lb.
Yield of coke per ton of coal	919·96 lb.
Ash in coke	4·60 per cent.

Analyst—Geo. R. Hislop, F.C.S., etc.

Date of Analysis— . . . . . .

Notes.

LANCASHIRE.

BISPHAM HALL COLLIERY COMPANY,

Orrell, near Wigan.

Colliery—BISPHAM HALL, Middle Mountain Mine Seam, Gauntley Pit.

Shipping Ports—Liverpool and Garston.

Rail—Lancashire and Yorkshire, Orrell Station (Orrell West Siding).

Canal—*Nil.*

Mountain Mine Nuts.

Class of Coal—Gas, Steam, Manufacturing, House.

The following is the result obtained from six wagons of gas coal nuts subjected to a practical working test over a run of fifteen hours :—

Purified gas per ton	11,200 cubic feet
Average illuminating power	16·25 sperm candles
Illuminating matter per ton	624·00 lb. sperm
Coke per ton	1,601 lb.
Coke	71·47 per cent.
Fixed carbon in coke	96·30 per cent.
Ash	3·70 per cent.

The yield of coke is high and of good quality, clean and possessing good heating power.

Analyst—Joseph Timmins.

Date of Analysis—May 15, 1903.

BLAINSCOUGH COLLIERY COMPANY LIMITED,

Coppull, Chorley.

Colliery—WELCH WHITTLE, Arley Seam, Welch Whittle Pit.

Shipping Ports—Preston and Garston.

Rail—L. and N. W., Coppull Station.

Canal— . . . . . .

Blainscough Arley Gas Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

		Per cent.
Chemical analysis—		
Volatile matter (containing 0·65 of sulphur)		31·63
Coke, consisting of		
Carbon	60·31	
Sulphur	0·17	
Ash	4·14	
		64·62
Water expelled at 212 degs. Fahr... ..		3·75
		100·00

LANCASHIRE.

Notes.

Practical results—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	11,552 cubic feet
Gas from 1 cubic foot of the coal	408·03 cubic feet
Specific gravity of the gas	486 (air 1,000)
Value of gas from 1 ton of coal in sperm	765·20 lb.
Illuminating power of gas in standard candles (per London Argand)	19·32 candles
Liquid products—	
Tar per ton of coal	12·40 gallons
Ammoniacal liquor per ton of coal ..	15·10 gallons
Strength of ammoniacal liquor	2·70 degs. Twadd.
Solid products—	
Coke per ton of coal..	1,447·48 lb.
Carbon in the coke	93·60 per cent.
Ash in the coke	6·40 per cent.
Sulphur in coke per ton of coal	3·87 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	12·86 lb.

This is an excellent gas coal, and as such yields a large volume of 19·32 candle gas, and at same time affording 12·92 cwt. per ton of very good coke. This coal possesses a moderate aqueous absorbent capacity, and is consequently a fairly dry one.

Analyst—Geo. R. Hislop, F.C.S., F.I.Inst., F.R.S.S.A.
Date of Analysis—June 8, 1895.

CHAMBER COLLIERY COMPANY LIMITED,

Hollinwood, Oldham.

Collieries—WOODPARK, Ashton-under-Lyne, STOCKFIELD, Chadderton, OAK, Hollinwood, ... Seam,
. . . . . Pit.

Shipping Port—*Nil.*

Rail—L. and Y. Railway Co., Stockfield, Werneth, Oldham and Hollinwood Stations.

Canal—Great Northern Railway Canal, Woodhouses, near Ashton-under-Lyne.

Chamber Colliery Gas Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

The following are the results of three analyses of this coal :—

A—Gas per ton of coal	10,500 cubic feet
Illuminating power	19·90 candles
Value of gas from 1 ton of coal	716 lb. sperm

Notes.

LANCASHIRE.

Chamber Colliery Gas Coal– *cont.*

B—Gas per ton of coal	10,460	cubic feet
Illuminating power	19·67	candles
Value of gas from 1 ton of coal	705	lb. sperm
C– Gas per ton of coal	11,600	cubic feet
Illuminating power	19	candles
Value of gas from 1 ton of coal	755	lb. sperm

Analyst— . . . . . .

Date of Analysis— . . . . . .

CHORLEY COLLIERY COMPANY LIMITED,

Moor Road, Chorley.

Colliery—MOOR ROAD, Mountain Mine Seam, Mountain Mine Pit.
Shipping Ports—Garston, Liverpool.
Rail—L. and N. W., and Lancashire and Yorkshire, Chorley Station.
Canal—*Nil.*

Chorley Colliery Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

Purified gas per ton	11,266	cubic feet
Average illuminating power, corrected for temperature and barometric pressure	15·5	sperm candles
Illuminating matter per ton	598·70	lb. sperm
Coke per ton	1,487	lb.
Coke	63·38	per cent.
Fixed carbon in coke	96·90	per cent.
Ash in coke	3·10	per cent.

Analyst—Joseph Timmins, Assoc.M.Inst.C.E.

Date of Analysis—May 21, 1897.

LANCASHIRE.

Notes.

COLLINS GREEN COLLIERY COMPANY LIMITED,

Earlestown.

Colliery—COLLINS GREEN, ... Seam, No. 1 Pit.
Shipping Ports—Garston, High Level, Herculaneum.
Rail—L. and N. W., Collins Green Station.
Canal—*Nil.*

Pemberton (4 ft.) Coal.

Class of Coal—House and Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal is black, possesses considerable lustre and brown streak. Fracture rather irregular, chiefly defined by slight deposits of charcoal. Cross-fracture partly cubical and resinoid, and laminated with brownish splinted coal, and contains considerable deposits of calcium carbonate, with trace of ferric bisulphide. Moderately cohesive and compact. Under distillation it intumesces and agglomerates. Colour of ash, dark brown. The coal is of very uniform density, mean specific gravity being 1,230 (water 1,000). Weight of 1 cubic foot, 76·87 lb.

		Per cent.
Volatile matters (containing 0·59 of sulphur)		33·70
Coke, consisting of—		
Carbon	54·92	
Sulphur	0·16	
Ash	5·12	
	---	60·20
Water expelled at 212 degs. Fahr.		6·10
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	11,150 cubic feet
Gas from 1 cubic foot of the coal	382·63 cubic feet
Specific gravity of the gas	482 (air 1,000)
Hydrocarbons absorbed by bromine . .	5·50 per cent.
Durability of 1 cubic foot by 5 in. jet flame	41 min. 16 sec.
Value of 1 cubic foot of gas	452·64 grains sperm
Value of gas from 1 ton of coal	735·54 lb. sperm
Illuminating power of gas in standard candles (per London Argand)	18·86 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·75 per cent.
Carbonic acid (CO_2) in foul gas	4·50 per cent.
Carbonic oxide (CO) in foul gas	6·10
Sulphur eliminated with volatile products	13·22 lb.

Notes.

LANCASHIRE.

Pemberton (4-ft.) Coal—*cont.*

Liquid products :—

Tar per ton of coal	13·60 gallons
Ammoniacal liquor per ton of coal ..	23·40 gallons
Strength of ammoniacal liquor	3·00 degs. Twad.
Hygrometric water per ton of coal ..	13·66 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	7·50 gallons

Solid products :—

Coke per ton of coal	1,348·48 lb.
Carbon in the coke	91·50 per cent.
Ash in the coke	8·50 per cent.
Sulphur in coke per ton of coal	3·58 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	12·57 lb.

This coal yields a considerable volume of gas of high quality, and at same time affords 12 cwt. of good coke per ton. It contains about the average of sulphur and water.

Analyst—George R. Hislop, F.C.S., etc.
Date of Analysis—January 27, 1900.

Colliery—BOLD, ... Seam, No. 2 Pit.

Collins Green Cannel Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

The coal is black, possesses considerable to moderate lustre, and yellowish brown streak; fracture irregular and coarse to curly with impressions of stigmaria; cross fracture angular and curly and exhibiting numerous small shining planes, and some nuggets of bright coal conchoidal in all directions, as also deposits of calcium carbonate and ferric bisulphide in the natural partings; very cohesive and compact; until distillation it intumesces and agglomerates; colour of ash, pale brown. Thickness of seam 29 in., and of very uniform density. Mean specific gravity 1,198 (water 1,000). Weight of 1 cubic foot, 74·87 lb.

		Per cent.
Volatile matters (containing 0·33 of sulphur)		46·14
Coke consisting of—		
Carbon	47·18	
Sulphur	0·17	
Ash	2·76	
		50·11
Water expelled at 212 degs. Fahr... ..		3·75
		100·00

LANCASHIRE.

Notes.

Gaseous products	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	13,440 cubic feet
Gas from 1 cubic foot of the coal	449·22 cubic feet
Specific gravity of the gas	638 (air 1,000)
Hydrocarbons absorbed by bromine ..	13·50 per cent.
Durability of 1 cubic foot by 5 in. jet flame	67 min. 28 sec.
Value of 1 cubic foot of gas..	858·72 grains sperm
Value of gas from 1 ton of coal	1,648·74 lb. sperm
Illuminating power of gas in std. candles..	35·78 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·00 per cent.
Carbonic acid (CO_2) in foul gas	2·50 per cent.
Carbonic oxide (CO) in foul gas	7·66 per cent.
Sulphur eliminated with volatile products	7·40 lb.
Liquid products—	
Tar per ton of coal	22·40 gallons
Ammoniacal liquor per ton of coal ..	14·80 gallons
Strength of ammoniacal liquor	2·75 degs. Twad.
Hygrometric water per ton of coal ..	8·40 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	5·10 per cent.
Solid products—	
Coke per ton of coal..	1,122·46 lb.
Carbon in the coke	94·50 per cent.
Ash in the coke	5·50 per cent.
Sulphur in coke per ton of coke	3·80 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	12·98 lb.

This is a remarkably good and pure cannel coal of the first class, and as such is without one detracting property, since while yielding a large volume of 35·78-candle gas, it affords 10 cwt. of first-class coke per ton, and contains very moderate amounts of sulphur and water.

Analyst—George R. Hislop, F.C.S., etc.

Date of Analysis—June 12, 1897.

Notes.

LANCASHIRE.

CROSS, TETLEY AND CO. LIMITED,

Bamfurlong, Wigan.

Colliery—BAMFURLONG AND MAINS, Deep Arley Seam, Bamfurlong Pit.

Shipping Ports—Garston, High Level, Herculaneum, Runcorn, Widnes, Ellesmere Port, Partington, Fleetwood, Preston.

Rail—L. and N. W., Bamfurlong and Mains Private Sidings.

Canal—Leeds and Liverpool, Pierhead alongside Bamfurlong Colliery.

Best Deep Wigan Arley Coal.

Class of Coal—Gas and House.

	Per cent.
Proximate analysis—	
Moisture	1·13
Volatile products	33·49
Fixed carbon	60·01
Sulphur	1·92
Ash (colour, brown)	3·45
Specific gravity	1,280
Weight of 1 cubic foot of coal	80 lb.
Space occupied by 1 ton	28 cubic feet
Commercial analysis—	
Gas made per ton of coal	11,233 cubic feet
Gas made per cubic foot of coal	401 cubic feet
Illuminating power	17·42 candles
Sperm value of 1 cubic foot of gas	418 grains sperm
Sperm value per ton	671 lb.
Coke per ton of coal	1,431 lb.
Coke per cent.	63·9 per cent.
Ash in coke per cent.	5·4 per cent.
Sulphur eliminated with volatile products per ton of coal	19·0 lb.
Sulphur in coke per ton of coal	24·0 lb.

Analyst—T. O. Paterson, C.E., F.G.S.

Date of Analysis—June 21, 1899.

LANCASHIRE.

Notes.

Colliery—BAMFURLONG AND MAINS, Wigan Four Feet Seam, Mains Pit.

Wigan Four-feet Cannel.

Class of Coal—Gas.

Specific gravity of cannel (water as 1,000) ..	1,220
Weight of 1 cubic foot	76·25 lb.
Fixed carbon in cannel	95·66 per cent.
Ash in cannel	4·34 per cent.
Purified gas per ton	15,400 cubic feet
Gas per cubic foot of coal	524·34 cubic feet
Illuminating power of gas consumed in a No. 4 flat-flame burner, naked light, in sperm candles	39·88 candles
Value in 1 cubic foot in sperm	957·12 grains
Weight of illuminating matter in sperm .	2,105·66 lb.
Weight of coke per ton of cannel	1,080 lb.
Percentage of coke in coal	48·21 per cent.
Fixed carbon in coke	91·0 per cent.
Ash in coke..	9·0 per cent.

Analyst—James Paterson, C.E., F.G.S.

Date of Analysis—July 3, 1891.

Wigan Four-feet Gas Coal.

Class of Coal—Gas.

The following is the result of an examination of three wagons of coal:—

	No. 1.	No. 2.	No. 3.
Specific gravity	1,264..	1,256..	1,269
Weight of 1 cubic foot	79..	78·5 ..	79·31 lb.
Sulphur in coal	— ..	— ..	— per cent.
Purified gas per ton	11,600..	10,700..	11,200 cubic feet
Gas per cubic foot of coal ..	409·1 ..	375·06 ..	396·56 cubic feet
Illuminating power of the gas ..	22·37 ..	20·9 ..	20·16 std. candles
Value of 1 cubic foot of gas ..	536·88 ..	501·60 ..	483·84 grains sperm
Value of 1 ton of coal	889·68 ..	766·73 ..	774·14 lb. sperm
Coke per ton of coal	1,213..	1,291..	1,306 lb.
Ash in coke..	7·00 ..	8·00 ..	5·00 per cent.
Fixed carbon in coke	93·00 ..	92·00 ..	95·00 per cent.
Sulphur per ton of coal	— ..	— ..	— lb.

Analyst—James Paterson, C.E., F.G.S.

Date of Analysis—June 12, 1893.

Notes.

LANCASHIRE.

Wigan Six-feet Coal.

Colliery—BAMFURLONG and MAINS, Wigan Six-feet Seam, Bamfurlong Pit.

Class of Coal—Steam, Gas, House, Manufacturing.

	Per cent.
Water expelled at 212 degs. Fahr.	2·8
Volatile hydrocarbons	33·4
Fixed carbon	60·4
Ash	2·2
Sulphur	1·2
	100·0

Gas per ton of coal at 60 degs. F. and 30 in. bar.	10,500 cubic feet
Illuminating power of gas in standard candles	18 candles
Percentage of coke in coal	62·6 per cent.
Coke per ton of coal	1,402 lb.
Colour of ash	Light red grey

The above coal gives a good yield of gas of high illuminating power. The ash is low. The coke is short and rather brittle.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis—September 23, 1904.

Trencherbone Coal.

Colliery—BAMFURLONG and MAINS, Trencherbone Seam, Mains Pit.

Class of Coal—Gas, Steam, Manufacturing, House.

	Per cent.
Water expelled at 212 degs. Fahr.	2·4
Volatile hydrocarbons	34·8
Fixed carbon	60·0
Ash	1·9
Sulphur	0·9
	100·0

Gas per ton of coal at 60 degs. F., and 30 in. bar.	11,000 cubic feet
Illuminating power of gas in standard candles	17·5 candles
Percentage of coke in coal	61·9 per cent.
Coke per ton of coal	1,386 lb.
Colour of ash	Light grey

The above coal gives a good yield of gas, and is low both in ash and sulphur. The coke is rather brittle.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis—September 23, 1904.

LANCASHIRE.

Notes.

RICHD. EVANS AND CO. LIMITED,

Haydock, near St. Helens.

Colliery—GOLBORNE, ... Seam, No. 2 Pit.
Shipping Port— . . . . . .
Rail— . . . . . Station.
Canal— . . . . . .

Colborne Gas Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

MINERALOGICAL CHARACTERS.—The coal is black, possesses moderate to considerable lustre and brown streak; fracture—largely defined by deposits of charcoal, while cross fracture is angular and crystalline to resinoid, with laminæ of brownish black splint coal and deposits of calcium carbonate with trace of ferric bisulphide in the natural partings. Moderately cohesive and compact; under distillation it intumesces and agglomerates; colour of ash, brown and white. Mean specific gravity, 75·81 lb.

		Per cent
Chemical analysis—		
Volatile matters (containing 0·42 of sulphur)		36·37
Coke consisting of—		
Carbon	54·85	
Sulphur	0·13	
Ash	3·45	
		58·43
Water expelled at 212 degs. Fahr. ..		5·20
		100·00

Practical results (gaseous products)—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	12,620 cubic feet
Gas from 1 cubic foot of the coal	427·10 cubic feet
Specific gravity of the gas	496 (air 1,000)
Hydrocarbons absorbed by bromine ..	5·85 per cent.
Durability of 1 cubic foot by 5 in. jet flame	44 mins. 9 secs.
Value of 1 cubic foot of gas ..	490·08 grains sperm
Value of gas from 1 ton of coal	883·54 lb. sperm
Illuminating power of gas in standard candles (per London Argand)	20·42 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·25 per cent.
Carbonic acid (CO_2) in foul gas	2·75 per cent.
Carbonic oxide (CO) in foul gas	7·25 per cent.
Sulphur eliminated with volatile products	10·51 lb.

Notes.

LANCASHIRE.

Golborne Gas Coal—*cont.*

Liquid products—	
Tar per ton of coal	15·85 gallons
Ammoniacal liquor per ton of coal ..	19·80 gallons
Strength of ammoniacal liquor	3·00 degs. Twad.
Hygrometric water per ton of coal ..	1·64 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	6·75 per cent.
Solid products—	
Coke per ton of coal	1,308·83 lb.
Carbon in the coke	94·10 per cent.
Ash in the coke	5·90 per cent.
Sulphur in coke per ton of coal	2·91 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	12·92 lb.

This is a remarkably good gas coal, since in addition to a large yield of illuminating matter, it affords 11·68 cwt. of excellent coke per ton. The coal at same time contains a very moderate amount of sulphur with about the average percentage of water.

Analyst—Geo. R. Hislop, F.C.S., M.S.C. Ind., F.R.S.S.A.
Date of Analysis—October 13, 1898.

Colliery—GOLBORNE, Seven Feet Seam, Golborne No. 1 Pit.

Colborne Seven Feet Coal.

Class of Coal—Steam and Gas.

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr... ..	4·1
Volatile hydrocarbons	34·6
Fixed carbon	58·2
Ash	2·2
Sulphur	0·9
	100·0

Practical results—	
Gas per ton of coal at 60 degs. F., and 30 in. bar.	10,980 cubic feet
Illuminating power of gas in standard candles	17·5 candles
Percentage of coke in coal	60·5 per cent.
Coke per ton of coal	1,355 lb.
Colour of ash	Grey brown

The above is a good steam-raising coal and gives a good yield of gas. The coke is hard, but rather porous.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.
Date of Analysis— . . . . . .

LANCASHIRE.

Notes.

Colliery—GOLBORNE, Four-feet Seam, Golborne No. 2 Pit.

Golborne Four-feet Coal.

Class of Coal— . . . . . .

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr...	4·8
Volatile hydrocarbons	35·0
Fixed carbon	55·7
Ash	3·5
Sulphur	1·0
	100·0

Practical results—	
Gas per ton of coal at 60 degs. F., and 30 in. bar.	12,300 cubic feet
Illuminating power of gas in standard candles	17·5 candles
Percentage of coke in coal	59·2
Coke per ton of coal	1,326 lb.
Colour of ash	Light red grey

The above yields a good supply of gas, and would make a good steam coal. The coke is also good and low in sulphur.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis— . . . . . .

Colliery—GOLBORNE, Five-feet Seam, Golborne No. 2 Pit.

Golborne Five-feet Coal.

Class of Coal— . . . . . .

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr... ..	4·1
Volatile hydrocarbons	34·8
Fixed carbon	57·3
Ash	2·1
Sulphur	1·7
	100·0

Practical results—	
Gas per ton of coal at 60 degs. F. and 30 in. bar.	13,000 cubic feet
Illuminating power of gas in standard candles	17·0 candles
Percentage of coke in coal	56·2 per cent.
Coke per ton of coal	1,258 lb.
Colour of ash	Light grey brown

The above yields a good supply of gas, and 57·8 per cent. of well-fused, hard, but rather porous coke, and the ash is low. The above would make a good household coal.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis— . . . . . .

Notes.

LANCASHIRE.

Colliery—HAYDOCK, ... Seam, Princess Pit.

Princess Arley Gas Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

MINERALOGICAL CHARACTERS.—The coal is black, possesses considerable lustre and brown streak; fracture rather irregular, and chiefly defined by thin deposits of charcoal; cross fracture angular and resinoid to crystalline, inclining to columnar in the natural partings, with considerable deposits of calcium carbonate and some ferric bisulphide. Moderately cohesive and compact; under distillation it intumesces and agglomerates; colour of ash, purple brown. Mean specific gravity 1,239 (water 1,000); weight of one cubic foot, 77·43 lb.

Chemical analysis—		Per cent.
Volatile matters (containing 0·45 of sulphur)		33·30
Coke consisting of—		
Carbon	60·00	
Sulphur	0·14	
Ash	2·71	
		62·85
Water expelled at 212 degs. Fahr... ..		3·85
		100·00

Practical results (gaseous products)—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar	12,460 cubic feet
Gas from 1 cubic foot of the coal	430·70 cubic feet
Specific gravity of the gas	468 (air 1,000)
Hydrocarbons absorbed by bromine ..	5·75 per cent.
Durability of one cubic foot by 5 in. jet flame	40 mins. 34 secs.
Value of one cubic foot of gas	445·44 grains sperm
Value of gas from 1 ton of coal	792·88 lb. sperm
Illuminating power of gas in standard candles (per London Argand)	18·56 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·30 per cent.
Carbonic acid (CO_2) in foul gas	2·25 per cent.
Carbonic oxide (CO) in foul gas	6·60 per cent
Sulphur eliminated with volatile products	10·11 lb.

LANCASHIRE.

Notes.

Liquid products—

Tar per ton of coal	15·40 gallons
Ammoniacal liquor per ton of coal ..	14·87 gallons
Strength of ammoniacal liquor	2·30 degs. Twad.
Hygrometric water per ton of coal ..	8·60 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	5·40 per cent.

Solid products—

Coke per ton of coal	1,407·84 lb.
Carbon in the coke	95·70 per cent.
Ash in the coke	4·30 per cent.
Sulphur in coke per ton of coal	3·10 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	13·14 lb.

This is an excellent gas coal, yielding as it does a large volume of 18½-candle gas, and at the same time affording 12·57 cwt. of very pure coke per ton. The coal likewise contains moderate amounts of both sulphur and water.

Analyst—Geo. R. Hislop, F.C.S., M.S.C. Ind., F.R.S.S.A.
Date of Analysis—October 10, 1898.

Colliery—HAYDOCK, ... Seam, Princess Pit.

Princess Rushy Park Coal.

Class of Coal—Gas, House.

Chemical analysis—

	Per cent.
Water expelled at 212 degs. Fahr... ..	4·1
Volatile hydrocarbons	33·9
Fixed carbon	59·1
Ash	2·0
Sulphur..	0·9
	100·0

Practical results—

Gas per ton of coal at 60 degs. F. and 30 in. bar.	12,600 cubic feet
Illuminating power of gas in standard candles	17·5 candles
Percentage of coke in coal	61·2 per cent.
Coke per ton of coal	1,370 lb.
Colour of ash	Light brown.

Good gas-making or household coal. The sulphur is low, and the coal would be an excellent one for coking purposes.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.
Date of Analysis— . . . . . .

Notes.

LANCASHIRE.

Colliery—HAYDOCK, ... Seam, Old Boston Pit.

Old Boston, Little Delf Coal.

Class of Coal— . . . . . .

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr.	4·6
Volatile hydrocarbons	30·1
Fixed carbon	63·3
Ash	1·4
Sulphur	0·6
	100·0

Practical results—	
Gas per ton of coal at 60 degs. F., and 30 in. bar.	10,800 cubic feet
Illuminating power of gas in standard candles	16·5 candles
Percentage of coke in coal	64·7 per cent.
Coke per ton of coal	1,449 lb.
Colour of ash	Light brown

The above is a very pure coal, being low in ash and extremely low in sulphur. It should be valuable for chemical and metallurgical purposes. It yields a hard coke.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis— . . . . . .

Colliery—HAYDOCK, Seven Feet Seam, Wood Pit.

Wood Pit, Seven Feet Coal.

Class of Coal—House.

Chemical analysis—	Per cent
Water expelled at 212 degs. Fahr.	5·8
Volatile hydrocarbons	33·7
Fixed carbon	58·2
Ash	1·4
Sulphur	0·9
	100·0

Practical results—	
Gas per ton of coal at 60 degs. F., and 30 in. bar.	10,630 cubic feet
Illuminating power of gas in standard candles	16·5 candles
Percentage of coke in coal	59·6 per cent.
Coke per ton of coal	1,334 lb.
Colour of ash	Light brown

The above should be a good house coal. The coke is porous, rather short, but low in sulphur.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis— . . . . . .

LANCASHIRE.

Notes.

Colliery—HAYDOCK, Seven Feet Seam, Old Boston Pit.

Old Boston Seven Feet Coal.

Class of Coal— . . . . . .

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr... ..	5·1
Volatile hydrocarbons	33·2
Fixed carbon	55·7
Ash	4·4
Sulphur	1·6
	100·0

Practical results—	
Gas per ton of coal at 60 degs. F. and 30 in. bar.	11,000 cubic feet
Illuminating power of gas in standard candles	17·0 candles
Percentage of coke in coal	60·1 per cent.
Coke per ton of coal	1,046 lb.
Colour of ash	Red grey

The above coal gives a well-fused but rather brittle coke, and should be good for household and heating purposes.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis— . . . . . .

Colliery—HAYDOCK, Nine Feet Seam, Old Boston Pit.

Old Boston Nine Feet Coal.

Class of Coal— . . . . . .

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr... ..	4·3
Volatile hydrocarbons	29·2
Fixed carbon	58·0
Ash	6·0
Sulphur	2·5
	100·0

Practical results—	
Gas per ton of coal at 60 degs. F., and 30 in. bar.	10,600 cubic feet
Illuminating power of gas in standard candles	16·5 candles
Percentage of coke in coal	64 per cent.
Coke per ton of coal	1,433 lb.
Colour of ash	Red grey

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis— . . . . . .

Notes.

LANCASHIRE.

Colliery—HAYDOCK, ... Seam, Wood Pit.

Florida Coal, Wood Pit.

Class of Coal— . . . . . .

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr... ..	5·0
Volatile hydrocarbons	35·0
Fixed carbon	57·2
Ash	1·8
Sulphur	1·0
	100·0

Practical results—		
Gas per ton of coal at 60 degs. F., and 30 in. bar	10,900	cubic feet
Illuminating power of gas in standard candles	18·0	candles
Percentage of coke in coal	59·0	per cent.
Coke per ton of coal	1,321	lb.
Colour of ash	Light red grey.	

The above is rich in gas of high illuminating power. It should be excellent for heating purposes.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis— . . . . . .

Colliery—HAYDOCK, ... Seam, Wood Pit.

Parr No. 1 Florida Coal.

Class of Coal— . . . . . .

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr... ..	5·5
Volatile hydrocarbons	35·2
Fixed carbon	54·4
Ash	4·0
Sulphur	0·9
	100·0

Practical results—		
Gas per ton of coal at 60 degs. F. and 30 in. bar.	13,000	cubic feet
Illuminating power of gas in standard candles	18·0	candles
Percentage of coke in coal	58·4	per cent.
Coke per ton of coal	1,308	lb.
Colour of ash	Grey brown.	

The above gives a good yield of high illuminating power. It should be good for household purposes.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis— . . . . . .

LANCASHIRE.

Notes.

Colliery—HAYDOCK, ... Seam, Wood Pit.

Old Boston Florida Coal.

Class of Coal— . . . . . .

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr... ..	4·9
Volatile hydrocarbons	34·0
Fixed carbon	57·8
Ash	2·3
Sulphur	1·0
	100·0

Practical results—		
Gas per ton of coal at 60 degs. F., and 30 in. bar.	10,500	cubic feet
Illuminating power of gas in standard candles	18·0	candles
Percentage of coke in coal	60·1	per cent.
Coke per ton of coal	1,346	lb.
Colour of ash	Light red grey.	

The coal is rich in gas of high illuminating power. It gives a hard well-fused coke, and is valuable for all heating purposes.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis— . . . . . .

Colliery—HAYDOCK, Six Feet Seam, Queen Pit.

Queen Pit Wigan Six-feet Coal.

Class of Coal— . . . . . .

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr... ..	4·8
Volatile hydrocarbons	31·9
Fixed carbon	58·4
Ash	3·8
Sulphur	1·1
	100·0

Practical results—		
Gas per ton of coal at 60 degs. F., and 30 in. bar.	12,000	cubic feet
Illuminating power of gas in standard candles	17·0	candles
Percentage of coke in coal	62·2	per cent.
Coke per ton of coal	1,392	lb.
Colour of ash	Brown	

The above is a slow-burning coal and suitable for steam-raising purposes. At a high temperature it gives a large yield of gas, but the coke is powdery.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis— . . . . . .

Notes.

LANCASHIRE.

Colliery—PARR, ... Seam, Parr No. 4 Pit.

Rushy Park Coal, Parr No. 4.

Class of Coal—Gas and Steam.

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr... ..	1·8
Volatile hydrocarbons	38·9
Fixed carbon	57·1
Ash	1·4
Sulphur..	0·8
	100·0

Practical results—	
Gas per ton of coal at 60 degs. F. and 30 in. bar.	11,900 cubic feet
Illuminating power of gas in standard candles	18·0 candles
Percentage of coke in coal	58·8 per cent.
Coke per ton of coal	1,317 lb.
Colour of ash	Buff.

The above is an excellent coal for gas-making and steam-raising purposes. The coke is excellent and very hard. Sulphur is low.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis— . . . . . .

Colliery—PARR, ... Seam, Parr No. 4 Pit.

Parr No. 4, Little Delf Coal.

Class of Coal— . . . . . .

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr... ..	1·5
Volatile hydrocarbons	35·4
Fixed carbon	61·0
Ash	1·3
Sulphur	0·8
	100·0

Practical results—	
Gas per ton of coal at 60 degs. F., and 30 in. bar.	10,900 cubic feet
Illuminating power of gas in standard candles	16·5 candles
Percentage of coke in coal	62·3 per cent.
Coke per ton of coal	1,395 lb.
Colour of ash	Light brown

The above yields a good hard, well-fused coke, very low in ash and sulphur. This should be excellent for chemical works and metallurgical purposes.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis— . . . . . .

LANCASHIRE.

Notes.

Colliery—PARR, Six Feet Seam, Parr No. 2 Pit.

Wigan Six-feet Coal, Parr No. 2.

Class of Coal— . . . . . .

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr... ..	4·6
Volatile hydrocarbons	30·7
Fixed carbon	60·4
Ash	3·2
Sulphur	1·1
	100·0

Practical results—	
Gas per ton of coal at 60 degs. F., and 30 in. bar.	10,000 cubic feet
Illuminating power of gas in standard candles	16·0 candles
Percentage of coke in coal	63·6 per cent.
Coke per ton of coal	1,424 lb.
Colour of ash	Light red grey

The above is adopted for household purposes. The coke is brittle and shaly.

Analyst—Wm. Jas. Orsman, F.I.C., F.C.S.

Date of Analysis— . . . . . .

EXECUTORS OF COLONEL HARGREAVES,

Burnley.

Colliery—HAPTON VALLEY, Mountain Mine Seam, Hapton Valley Pit.

Shipping Port—Liverpool.

Rail—Lancashire and Yorkshire, Burnley Station.

Canal—Leeds and Liverpool.

Mountain Mine Coal.

Class of Coal—Coking and Steam.

	Per cent.
Sulphur	0·41
Ash	1·14
Moisture	1·71
Volatile matter	28·33
Coke	71·67
	100·00

Analyst—Edward Riley.

Date of Analysis—January 31, 1905.

Notes.

LANCASHIRE.

Collieries—BURNLEY, ... Seam, ... Pit.

Arley Mine Coal.

Class of Coal—Gas.

Test made with 5 tons, in the Burnley Corporation experimental plant:—

Gas made per ton of coal, corrected to 60 degs. Fahr. and 30 in. bar.	10,480 cubic feet
Illuminating power of the gas, corrected to 5 cubic feet per hour and for temperature and pressure	17·18 candles
Coke made per ton of coal	13·33 cwt.
Quality of coke	Good
*Ammonium sulphate made per ton of coal	25 lb.
*Tar made per ton of coal	148·5 lb.

* These results are obtained from a year's working with this coal at the Burnley Corporation Gasworks.

Analysis of coal—	Per cent.
Moisture	1·14
Volatile matters	36·26
Ash	3·63
Fixed carbon	58·97
	100·00
Sulphur (contained in the above)	2·26

Analysts—Raymond Ross, F.I.C., F.C.S., and Jno. P. Leather, F.C.S.
Date of Analysis—July 9, 1903.

GEORGE HARGREAVES AND CO.,

The Collieries, Accrington.

Colliery—ACCRINGTON, ... Seam, Huncoat Pit.
Shipping Ports—Fleetwood and Manchester.
Rail—Lancashire and Yorkshire, Accrington Station.
Canal—*Nil.*

Lower Mountain Mine Coal.

Class of Coal—Coking and Steam.

	Per cent.
Volatile matter	29·59
Coke	70·41
	100·00
Sulphur	0·325
Ash	5·900
Moisture	1·100

Analyst—Edward Riley.
Date of Analysis—October 17, 1904.

LANCASHIRE.

Notes.

HINDLEY FIELD COAL COMPANY LIMITED,

The Grange, Hindley, near Wigan.

Colliery—HINDLEY FIELD, ... Seam,
. . . . . Pit.

Shipping Ports—Garston, Runcorn, Preston, Liverpool, and Partington.

Rail—Station *nil.*

Canal—*Nil.*

Long Arley Mine Coal.

Class of Coal— . . . . . .

A sample of this coal representing the entire product of the seam, gave on examination the following results :—

MINERALOGICAL CHARACTERS.—Colour, black with considerable lustre and brownish black streak. Fracture, partly defined by intermittent laminæ of vegetable charcoal and therefore irregular. Cross-fracture, crystalline and resinoid, with very thin deposits of carbonate of lime in the natural partings. Moderately cohesive, compact and non-porous. On the fire it intumesces and agglomerates. Ash, dark brown, and chiefly ferric oxide. Thickness of seam, 4 ft. ; mean specific gravity, 1,273 (water, 1,000). Weight of 1 cubic feet, 79·56 lb.

		Per cent.
Chemical analysis—		
Volatile matters (containing 0·22 of sulphur)		33·55
Coke, consisting of—		
Carbon	61·70	
Sulphur	0·13	
Ash	1·92	
		63·75
Water expelled at 212 degs. Fahr. ..		2·70
		100·00

Practical results (gaseous products)—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	11,618 cubic feet
Gas from 1 cubic foot of the coal	412·64 cubic feet
Specific gravity of the gas	486 (air 1,000)
Hydrocarbons absorbed by bromine ..	6·20 per cent.
Durability of 1 cubic foot by 5 in. jet flame	44 mins. 40 secs.
Value of 1 cubic foot of gas	462·24 grains sperm
Value of gas from 1 ton of coal	766·90 lb. sperm
Illuminating power of gas in standard candles	19·26 candles
Sulphuretted hydrogen (H_2S) in foul gas	0·50 per cent.
Carbonic acid (CO_2) in foul gas	1·50 per cent.
Carbonic oxide (CO) in foul gas	4·00 per cent.
Sulphur eliminated with volatile products	4·93 lb.

Notes.

LANCASHIRE.

Long Arley Mine Coal—*cont.*

Liquid products—

Tar per ton of coal	14·20 gallons
Ammoniacal liquor, per ton of coal ..	11·60 gallons
Strength of ammoniacal liquor	3·80 degs. Twad.
Hygrometric water, per ton of coal ..	6·04 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	4·50 per cent.

Solid products—

Coke per ton of coal..	1,428·00 lb.
Carbon in the coke	97·00 per cent.
Ash in the coke	3·00 per cent.
Sulphur in coke per ton of coal	2·91 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	13·43 lb.

This is an uncommonly rich and valuable coking coal. It requires a moderate heat for distillation, yields a large volume of gas of high photogenic power, and affords 12¾ cwt. of coke of the purest class. It possesses also a very moderate aqueous absorbent capacity, and contains a very small amount of sulphur.

Compared with the Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas per ton, and 1,535·5 lb. of sperm, and having regard to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 60·63.

Analyst—George R. Hislop, F.C.S., F.R.S.S.A., etc.

Date of Analysis—May 15, 1880.

Arley Yard Coal.

Class of Coal— . . . . . .

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

MINERALOGICAL CHARACTERS.—Colour, black with considerable lustre and brownish-black streak. Fracture, small semi-crystalline and scalariform, with intermittent laminæ of vegetable charcoal. Cross-fracture, partly angular, curly, and inclining to resinoid, the natural partings exhibiting shining resinoid planes, and deposits of carbonate of lime, but without trace of pyrites. Very compact and moderately friable. On the fire it intumesces and agglomerates. Ash, dark brown, and chiefly ferric oxide. Thickness of seam, 3 ft.; mean specific gravity 1,280 (water 1,000); weight of 1 cubic foot, 80 lb.

LANCASHIRE.

Notes.

		Per cent.
Chemical analysis—		
Volatile matters (containing 0·45 of sulphur)		33·57
Coke, consisting of—		
Carbon	59·09	
Sulphur	0·23	
Ash	3·01	
		62·33
Water expelled at 212 degs. Fahr... ..		4·10
		100·00
Practical results (gaseous products)—		
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.		10,864 cubic feet
Gas from 1 cubic foot of the coal		388·0 cubic feet
Specific gravity of the gas		478 (air 1,000)
Hydrocarbons absorbed by bromine ..		5·10 per cent.
Durability of 1 cubic foot by 5 in. jet flame		40 mins. 10 secs.
Value of 1 cubic foot of gas		399·84 grains sperm
Value of gas from 1 ton of coal		620·55 lb. sperm
Illuminating power of gas in standard candles (per London Argand and 7 in. chimney)		16·66 candles
Sulphuretted hydrogen (H_2S) in foul gas		1·33 per cent.
Carbonic acid (CO_2) in foul gas		2·25 per cent.
Carbonic oxide (CO) in foul gas		6·25 per cent.
Sulphur eliminated with volatile products		10·09 lb.
Liquid products :—		
Tar per ton of coal		14·21 gallons
Ammoniacal liquor, per ton of coal ..		17·82 gallons
Strength of ammoniacal liquor		3·25 degs. Twad.
Hygrometric water, per ton of coal ..		9·18 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)		5·37 per cent.
Solid products—		
Coke per ton of coal		1,396·19 lb.
Carbon in the coke		95·20 per cent.
Ash in the coke		4·80 per cent.
Sulphur in coke per ton of coal		5·14 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..		13·04 lb.

This is an excellent gas and coking coal. It parts with its volatile products within the average time and at a moderate heat, contains a moderate amount of both sulphur and water, and affords 12·46 cwt. of first-class coke.

Compared with the Nitshill and Lesmahagow Coal Company's cannel coal represented by 100 (calculated on the basis of a production

Notes.

LANCASHIRE.

Arley Yard Coal—*cont.*

of 13,000 cubic feet of gas per ton, and 1,535·5 lb. of sperm, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 49·43.

Analyst—George R. Hislop, F.C.S., F.R.S.S.A., etc.

Date of Analysis—May 15, 1882.

A. KNOWLES AND SONS LIMITED,

Pendlebury, near Manchester.

Colliery—PENDLETON . . . . . Seam, Rams Mine Pit.

Shipping Ports—Manchester, Garston, Runcorn, Preston.

Rail—L. and N. W. and Lancs. and Yorks.; Private Sidings, Pendleton, Lancs. and Yorks.; Agecroft, Bundle Head Goods Station, Clifton Hall and Pendlebury, L. and N. W.; Molyneux Junction, Lancs. and Yorks.; Patricroft, L. and N. W.

Canal—Manchester, Bolton and Bury.

Rams Mine Seconds.

Class of Coal—Gas, Steam, Manufacturing, House.

I hereby certify that I have made a most careful analysis, technical test, and examination, with the understated results, of the sample of coal marked "Rams Mine Seconds from Pendleton Colliery."

Chemical analysis—	
Specific gravity	1·27
Weight per cubic foot	79·49 lb.
Total sulphur	0·43 per cent.
Total ash	4·02 per cent.
Total volatile matter	48·43 per cent.
Water	2·09 per cent.
Total volatile and combustible matter	95·93 per cent.
Technical test and examination—	
Gas per ton	10,016 cubic feet
Illuminating power of gas	17 standard candles
Coke per ton	1,460 lb.
Tar per ton	101 lb.
Ammoniacal liquor per ton	307 lb.

The sulphur is present in small quantity, while the percentage of ash is low and normal. The coke is of a thoroughly satisfactory quality,

Notes.

clean, and stands a good burden. The tar is also of a thoroughly satisfactory and normal quality. The ammoniacal liquor is calculated at 5 degs. Twaddell, and is, therefore, equal to 307 lb. of "10-oz. liquor."

From the foregoing tabulated results of my analysis and testing, I am of decided opinion that the coal in question is a good gas coal, and thoroughly suitable for gas manufacturing and coking purpeses.

Analyst—W. Hepworth Collins, F.C.S., F.G.S., F.R.M.S., etc.
Date of Analysis—September 15, 1894.

Colliery—AGECROFT, ... Seam, Dow Mine Pit.

Dow Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

I hereby certify that I have made a most careful analysis, technical test, and examination, with the understated results, of a sample of coal marked "Dow Coal from Agecroft Colliery."

Chemical analysis—

Specific gravity	1·28
Weight per cubic foot	80 lb.
Total sulphur	0·40 per cent.
Total ash	3·17 per cent.
Volatile matter	52·00 per cent.
Water	1·05 per cent.
Total volatile and combustible matter ..	96·83 per cent.

Technical test and examination—

Gas per ton	10,950 cubic feet
Illuminating power of gas	17 standard candles
Coke per ton	1,466 lb.
Tar per ton	107 lb.
Ammoniacal liquor per ton	363 lb.

The coke is particularly clean, stands a good burden, and is a thoroughly satisfactory quality. The sulphur compounds and the ash are present in very small quantity indeed. The tar is of a thoroughly good quality also. The ammoniacal liquor is calculated at 5 degs. Twaddell, and is therefore equal to 363 lb. of "10 oz. liquor."

From the foregoing tabulated results of my analyses and testings, I am of decided opinion that the coal in question is a good gas coal, eminently suited for gas manufacturing, and quite equal and in some cases superior to many of the well-known gas coals at present in large use.

Analyst—W. Hepworth Collins, F.C.S., F.G.S., F.R.M.S., etc.
Date of Analysis—August 21, 1894.

Notes.

LANCASHIRE.

Colliery—CLIFTON HALL, ... Seam, Trencherbone Mine Pit.

Trencherbone Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

I hereby certify that I have made a most careful analysis, technical test, and examination, with the understated results, of a sample of coal marked "Trencherbone Coal from Clifton Hall Colliery."

Specific gravity	1·28
Weight per cubic foot	80 lb.
Total sulphur	0·37 per cent.
Total ash	3·01 per cent.
Volatile matter	52·16 per cent.
Water	1·07 per cent.
Total volatile and combustible matter ..	96·99 per cent.

Technical test and examination—

Gas per ton	10,967 cubic feet
Illuminating power of gas	17 standard candles
Coke per ton	1,476 lb.
Tar per ton	110 lb.
Ammoniacal liquor per ton	365 lb.

The sulphur compounds and ash are only present in very small quantity indeed. The coke is particularly clean, stands a good burden, and is of a thoroughly satisfactory quality. The tar is of a thoroughly good quality also. The ammoniacal liquor is calculated at 5 degs. Twaddell, and is therefore equal to 365 lb. of "10 oz. liquor."

From the foregoing tabulated results of my analyses and testings, I am of decided opinion that the coal in question is a good gas coal, eminently suitable for gas manufacturing, and quite equal and in some instances superior to many of the well-known gas coals at present so largely used.

Analyst—W. Hepworth Collins, F.C.S., F.G.S., F.R.M.S., etc

Date of Analysis—August 21, 1894.

LANCASHIRE.

Notes.

MOSS HALL COAL COMPANY LIMITED.

Wigan.

Colliery— . . . . . Seam, ... Pit.
Shipping Port— . . . . . .
Rail— . . . . . Station.
Canal— . . . . . .

Moss Hall Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal	10,800	cubic feet
Yield of coke per ton of coal	1,444	lb.
Ash in coke	2·32	per cent.
Specific gravity of the coal	1,266	
Condensation by bromine	5	per cent.
Illuminating power	16·75	std. candles
Value of 1 cubic foot	402	grains sperm
Value of gas per ton of coal	620·23	lb. sperm
Sulphur	1·183	per cent.

Analyst— . . . . . .
Date of Analysis— . . . . . .

P. W. PICKUP LIMITED,

Rishton, Blackburn.

Colliery—RISHTON, ... Seam, Rishton Pit.
Shipping Port—Preston.
Rail—L. and Y., Rishton Station.
Canal—Leeds and Liverpool.

Rishton Lower Mountain Mine Coal.

Class of Coal—Steam, Coking, Manufacturing and House.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

Proximate analysis.—		Per cent.
Volatile matters (containing 0·68 of sulphur)		20·72
Coke, consisting of—		
Carbon	73·73	
Sulphur	0·18	
Ash	3·24	
		77·15
Water expelled at 212 degs. Fahr...		2·13
		100·00

Notes.

LANCASHIRE.

Rishton Lower Mountain Mine Coal—*cont.*

Ultimate analysis—	Per cent.
Carbon	81·68
Hydrogen	4·99
Oxygen	5·81
Nitrogen	1·86
Sulphur	0·45
Ash	2·86
Moisture	2·35
	100·00

Calorific power:—Pounds of water evaporated from 212 degs. Fahr. by 1 lb. of the coal as determined by Thomson's calorimeter = 15 lb.

Analyst—H. Dunford Smith.

Date of Analysis—December 1901.

J. SPEAKMAN AND SONS,

Leigh, Lancashire.

Colliery—BEDFORD, ... Seam, Bedford Pit.
Shipping Port—All Lancashire Ports.
Rail—L. and N. W., Speakman Sidings, Leigh and Bedford Station.
Canal—*Nil.*

Bedford Gas Cobbles.

Class of Coal—Gas.

		Per cent.
Volatile matter (containing 0·58 per cent. of sulphur)		35·37
Coke, consisting of—		
Carbon	55·88	
Sulphur	0·27	
Ash	3·08	
		59·23
Water expelled at 212 degs. Fahr.		5·40
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. F. and 30 in. bar.	12,225 cubic feet
Gas from 1 cubic foot of the coal	423·16 cubic feet
Specific gravity of the gas	505 (air 1,000)
Hydrocarbons absorbed by bromine	6·50 per cent.
Durability of 1 cubic foot by 5 in. jet flame	46 min. 48 sec.
Value of 1 cubic foot of gas	507·12 grains sperm
Value of gas from 1 ton of coal	860·49 lb. sperm
Illuminating power of gas	20·53 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·50 per cent.
Carbonic acid (CO_2) in foul gas	3·33 per cent.
Carbonic oxide (CO) in foul gas	7·00 per cent.
Sulphur eliminated with volatile products	13·00 lb.

LANCASHIRE.

Notes.

Liquid products—	
Tar per ton of coal	13·50 gallons
Ammoniacal liquor per ton of coal ..	21·60 gallons
Strength of ammoniacal liquor	2·70 degs. Twadd.
Hygrometric water per ton of coal	12·09 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	7·43 per cent.
Solid products—	
Coke per ton of coal	1,326·75 lb.
Carbon in the coke	94·80 per cent.
Ash in coke	5·20 per cent.
Sulphur in coke per ton of coal	6·04 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	13·02 lb.

Analyst—George R. Hislop, F.C.S., &c.

Date of Analysis—November 12, 1903.

Rams Gas Coal.

Class of Coal—Gas.

Volatile matters (containing 0·51 of sulphur) 34·84 per cent.

	Per cent.	
Coke consisting of—		
Carbon	56·84	
Sulphur	0·23	
Ash	2·88	
		59·95
Water expelled at 212 degs. Fahr.		5·21
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	12·055 cubic feet
Gas from 1 cubic foot of the coal	114·39 cubic feet
Specific gravity of the gas	490 (air 1,000)
Hydrocarbons absorbed by bromine ..	6·25 per cent.
Durability of 1 cubic foot by 5 in. jet flame	45 min. 8 sec.
Value of 1 cubic foot of gas	472·32 grains sperm
Illuminating power of gas in standard candles	19·68 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·33 per cent.
Carbonic acid (CO_2) in foul gas	3·50 per cent.
Carbonic oxide (CO) in foul gas	7·25 per cent.
Sulphur eliminated with volatile products	11·59 lb.

Notes.

LANCASHIRE.

Rams Gas Coal- *cont.*

Liquid products—

Tar per ton of coal	13·25 gallons
Ammoniacal liquor per ton of coal.. ..	21·20 gallons
Strength of ammoniacal liquor	2·75 degs. Twadd.
Hygrometric water per ton of coal ..	11·67 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	7·20 per cent.

Solid products—

Coke per ton of coal..	1,342·88 lb.
Carbon in the coke	95·00 per cent.
Ash in the coke	4·80 per cent
Sulphur in coke per ton of coal	4·98 per cent
Heating power of 1 lb. of coke (water from boiling point into steam)	13·08 per cent.

Analyst—George R. Hislop, F.C.S., &c.
Date of Analysis—November 12, 1903.

WIGAN COAL AND IRON COMPANY LIMITED,

Wigan.

Colliery— . . . . . Haigh Yard Seam, ... Pit.
Shipping Ports—All Mersey Ports, and Preston, Fleetwood and Glasson Dock.
Rail—L. and N. W., L. and Y., and Great Central, Wigan and Hindley Stations.
Canals—Leeds and Liverpool, Bridgwater.

Haigh Yard Coal.

Class of Coal—Steam, Manufacturing, House.

Specific gravity	1·28
Weight per cubic foot	80·0 lb.
Ash	1·7 per cent.
Volatile hydrocarbons	34·0 per cent.
Fixed carbon	63·83 per cent.
Coke produced	66·0 per cent.
Sulphur	0·95 per cent.
Ash in coke	2·5 per cent.
Calorific value	7,458 heat units
Water converted into steam by 1 lb. of fuel	13·85 lb.

Analyst—T. H. Byrom.
Date of Analysis— . . . . , 1905.

LANCASHIRE.

Notes.

Colliery—WIGAN COAL AND IRON COMPANY LIMITED, King Seam.

King Coal.

Class of Coal—Manufacturing, House.

Specific gravity	1·28	
Weight per cubic foot	80·0	lb.
Ash	3·1	per cent.
Sulphur	2·35	per cent.
Volatile hydrocarbons	35·5	per cent.
Fixed carbon	60·23	per cent.
Coke produced	64·5	per cent.
Ash in coke	4·8	per cent.
Calorific value	7,392	heat units
Water converted into steam by 1 lb. of fuel	13·75	lb.

Analyst—T. H. Byrom.

Date of Analysis— . . . . , 1905.

Colliery—WIGAN COAL AND IRON COMPANY LTD., Seven-feet Seam.

Hard Seven-feet Coal.

Class of Coal—Steam, Manufacturing, House.

Specific gravity	1·26	
Weight per cubic foot	78·75	lb.
Ash	1·9	per cent.
Sulphur	0·64	per cent.
Volatile hydrocarbons	39·4	per cent.
Fixed carbon	58·1	per cent.
Coke produced	60·6	per cent.
Ash in coke	3·1	per cent.
Calorific value	7,480	heat units
Water converted into steam per 1 lb. fuel	13·9	lb.

Analyst—T. H. Byrom.

Date of Analysis— . . . . , 1905.

Notes.

LANCASHIRE.

Colliery— . . . . . Crombouke Seam, ... Pit.

Crombouke Coal.

Class of Coal—Steam, Manufacturing, House.

Specific gravity	1·27	per cent.
Weight per cubic foot	79·37	lb.
Ash	2·3	per cent.
Sulphur	1·37	per cent.
Volatile hydrocarbons	41·0	per cent.
Fixed carbon	55·4	per cent.
Coke produced	59·0	per cent.
Ash in coke	3·9	per cent.
Calorific value	7,370	heat units
Water converted into steam per 1 lb. fuel	13·7	lb.

Analyst—T. H. Byrom.

Date of Analysis— . . , 1905.

Colliery—WIGAN COAL AND IRON COMPANY LIMITED, Yard Seam.

Long Yard Coal.

Class of Coal—Steam, Manufacturing, House.

Specific gravity	1·26	
Weight per cubic foot	78·75	lb.
Ash	2·9	per cent.
Sulphur	1·42	per cent.
Volatile hydrocarbons	37·4	per cent.
Fixed carbon	58·7	per cent.
Coke produced	62·6	per cent.
Ash in coke	4·6	per cent.
Calorific value	7,370	heat units
Water converted into steam per 1 lb. fuel	13·7	lb.

Analyst—T. H. Byrom.

Date of Analysis— . . , 1905.

LANCASHIRE.

Notes.

Colliery—WIGAN COAL AND IRON COMPANY LIMITED, Arley Seam.

Best Coal.

Class of Coal—Gas and House.

Specific gravity	1·26	
Weight per cubic foot	78·75	lb.
Ash	2·9	per cent.
Sulphur	1·82	per cent.
Volatile hydrocarbons	36·3	per cent.
Fixed carbon	58·8	per cent.
Coke produced	63·7	per cent.
Ash in coke	4·5	per cent.
Calorific value	7,590	heat units
Water converted into steam per 1 lb. fuel	14·1	lb.

Analyst—T. H. Byrom.

Date of Analysis— . . . , 1905.

Notes.

LEICESTER.

THE NAILSTONE COLLIERY COMPANY,

Nailstone Colliery, near Leicester.

Colliery—NAILSTONE, Upper Main Seam, No. 1 Pit.
Shipping Ports—Hull, Grimsby, Lynn, Goole, Garston.
Rail—Midland and L. and N. W., Bagworth (Mid.), Hugglescote (L. and N. W.) Station.
Canal—By transhipment from Leicester.

Upper Main Seam Steam Coal.

Class of Coal—Steam.

	Per cent.
Carbon	70·42
Hydrogen	4·95
Nitrogen	1·35
Oxygen	15·77
Sulphur	1·44
Ash	6·07
	100·00
Water	13·22
Volatile or gaseous constituents	30·99
Percentage yield of coke	50·52
Ash	5·27
	100·00
Sulphur	1·25 per cent.
Calorific equivalent	7,315 heat units
British thermal units	13,170 B.T.U.
Heat equivalent in lb. for feed-water at 60 degs. raised to 160 lb. pressure—	
Dried coal	10·3 lb.
13 per cent. moisture	9·0 lb.

Analyst—Matthew J. Cannon, F.C.S.

Date of Analysis—July 1, 1905.

Notes.

LEICESTER.

Colliery—NAILSTONE, Deep Main Seam, No. 2 Pit.

Best House Coal.

Class of Coal—Steam, Manufacturing, House.

	Per cent.
Carbon	74·91
Hydrogen	4·98
Nitrogen	1·22
Oxygen	14·99
Sulphur	0·86
Ash	3·04
	100·00

	Per cent.
Water	13·20
Volatile or gaseous constituents	30·00
Percentage yield of coke	54·16
Ash	2·64
	100·00

Sulphur	0·75 per cent.
Calorific equivalent	7,700 heat units
British thermal units	13,860 B.T.U.

Analyst—Matthew J. Cannon, F.C.S.

Date of Analysis—July 1, 1905.

Notes.

MONMOUTH.

BLINDELL AND WAKEFIELD,

Exchange Buildings, Cardiff.

Colliery—JOHN BLINDELL'S BLACK VEIN, ... Seam, Glyn Pits.

Shipping Ports—Newport, Cardiff, Penarth, Barry.

Rail—Great Western, Crane Street, Pontypool, Station.

Canal—*Nil.*

John Blindell's Black Vein Steam Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

	Per cent.
Moisture	2·00
Ash	2·48
Fixed carbon	60·39
Volatile matter	35·13
	100·00
Sulphur	1·28
Coke..	62·87

The evaporative power as given by Thomson's calorimeter is 1 lb. of coal equals 14·07 lb. of water at 100 C.

Analyst—George R. Thompson.

Date of Analysis—March 1900.

EBBW VALE STEEL, IRON AND COAL COMPANY LIMITED,

Ebbw Vale.

Colliery—ABERCARN, ... Seam, Prince of Wales Pit.

Shipping Ports—Newport, Cardiff.

Rail—Great Western, Abercarn Colliery Station.

Canal—*Nil*

Abercarn Coal.

Class of Coal— . . . . . .

Yield of gas per ton of coal	12,300 cubic feet.
Illuminating power	15·97 candles.
Value of 1 cubic foot of gas..	383 grains sperm
Value of gas per ton of coal	673 lb. sperm

Analyst— . . . . . .

Date of Analysis— . . . .

MONMOUTH.

Notes.

Colliery—GRAIG FAWR, ... Seam, Graig Fawr Pit.
Shipping Ports—Newport, Cardiff.
Rail—Great Western, Graig Fawr Colliery Station.
Canal— . . . . . .

Ebbw Vale Red Ash Coal.

Class of Coal—Gas, Manufacturing, House.

Yield of gas per ton of coal..	11,800 cubic feet
Illuminating power	15 standard candles
Value of 1 cubic foot of gas..	360 grains sperm
Value of gas per ton of coal..	607 lb. sperm
Specific gravity of the coal	1,274
Condensation by bromine	5 per cent.
Gas purified by 1 cwt. lime..	14,000 cubic feet
Yield of coke per ton of coal	1,466 lb.
Ash in coke	3·35 per cent.

Analyst— . . . . . .
Date of Analysis— . . .

Colliery—EBBW VALE, ... Seam, Ebbw Vale Pit.
Shipping Ports—Newport, Cardiff.
Rail—Great Western, and L. and N. W., Ebbw Vale Station.
Canal— . . . . . .

Ebbw Vale Steam Coal.

Class of Coal—Steam, Smokeless Steam, Manufacturing, House.

	Per cent.
Carbon	89·470
Hydrogen	5·480
Nitrogen	1·112
Oxygen	2·687
Sulphur	0·621
Ash	0·630
	100·000

Analyst—Edward Riley, F.C.S.
Date of Analysis—October 28, 1896.

Notes.

MONMOUTH.

ELLED COAL COMPANY,

Abercarn.

Colliery— . . . . . Seam, Quarry Pit.
Shipping Ports—Newport, Cardiff.
Rail—Great Western, Abercarn Station.
Canal— . . . . . .

Red Ash Coal.

Class of Coal—Steam, Manufacturing, House.

	Per cent.
Red ash	5·200
Sulphur	2·243
Volatile matter	29·917
Fixed carbon	62·640
Water evaporated by 1 lb. of coal, 14 lb.	100·000

Analyst—John Parry.
Date of Analysis— . . . . , 1905.

ELLED COLLIERY COMPANY LIMITED,

14, West Bute Street, Dock, Cardiff.

Colliery—ELLED, PONTNEWYNYDD, Elled Seam, Elled Pit.
Shipping Ports—Newport, Cardiff, Barry.
Rail—Great Western, Pontnewynydd Station.
Canal—*Nil.*

Elled Coal.

Class of Coal—House, Steam, Gas.

	Per cent.
Volatile matter	31·30
Ash	4·52
Sulphur	1·77
Coke	68·00

Colour of ash pinky grey. The coke, metallic in appearance, of good hard quality.

Yield of gas per ton	(corrected)	10,542 cubic feet
Illuminating power of gas		17·95 candles
Value of coal per ton		37,845 candles
Ditto in terms of sperm		648·77 lb.
Yield of coke		13·4 cwt. per ton
Yield of ash		6·71 per cent

Notes.

MONMOUTH.

It is a very good coal for house purposes and for all purposes in which a bituminous coal is required. As a gas coal it is exceedingly well adapted, yielding as it does a large quantity of gas of good and most suitable illuminating power. It is a coal which is capable of yielding gas of ample illuminating power without the addition of cannel, and at the same time gives a coke of good quality, such as is not usually obtained from coals which furnish gas in like quality and of a similar lighting power.

Analyst—J. W. Thomas.
Date of Analysis— . . . . . .

NEWPORT ABERCARN BLACK VEIN STEAM COAL COMPANY LIMITED,

Newbridge.

Colliery—ABERCARN, ... Seam, Celynen Pit.
Shipping Ports—Newport, Cardiff, Penarth, Barry.
Rail—Great Western, Abercarn Station.
Canal— . . . . . .

Newport-Abercarn Black Vein Steam Coal.

Class of Coal—Steam.

	Per cent.
Carbon	84·91
Hydrogen	5·33
Oxygen	3·27
Nitrogen	1·61
Sulphur	0·57
Ash	4·31
	100·00

	Per cent.
Volatile matter	25·84
Coke	74·16
	100·00

Calorific value as determined by Thompson's calorimeter:—

Calories	8,030
Evaporative power	14·95 lb.
Moisture	0·80 per cent.

Analyst—Edward Riley, F.I.C., F.C.S.
Date of Analysis—February 16, 1903.

Notes.

MONMOUTH.

PARTRIDGE, JONES AND CO. LIMITED,

93, Dock Street, Newport (Mon.).

Colliery—LLANERCH, Meadow Vein Seam, ... Pit.
Shipping Ports—Newport, Cardiff, Barry.
Rail—Great Western, Pontnewynydd Station.
Canal— . . . . . .

Llanerch Gas Coal.

Class of Coal—Gas.

	Per cent.
Large coal—	
Volatile matter	34·70*
Ash	2·77
Fixed carbon	62·53
	100·00

* Including water 1·04 per cent.

Total sulphur	0·82
Coke	65·30
Coke—	
Ash	4·24
Sulphur	0·73
Fixed carbon	95·03
	100·0

Yield of coke per 1 ton of the coal, 13 cwt., 0 qr., 7 lb. This coke is a fine hard bright coke, remarkably free from sulphur, and well adapted for household purposes. Upon actual trial, the sample yielded at standard pressure and temperature 9,885 cubic feet of purified gas of illuminating power of 14½ candles, as determined by London Argand. The crude gas is very free from all sulphur compounds other than sulphuretted hydrogen.

Analyst—George R. Thompson.
Date of Analysis—May 15, 1901.

Notes.

MONMOUTH.

Colliery—BLAENSERCHAN, Black Vein Seam, ... Pit.

Mynydd Black Vein Steam Coal.

Class of Coal—Steam.

Large coal—	Per cent.
Carbon	82·91
Hydrogen	4·89
Oxygen	5·93
Nitrogen	1·00
Ash	3·12
Sulphur	1·11
Moisture	1·04
	100·00

The value of the coal in calories is 8,154, with a theoretical evaporative power of nearly 15·2 lb. of water at 100 degs. Cent. per 1 lb. of the coal.

Analyst—George R. Thompson.

Date of Analysis—May 15, 1901.

Colliery—LLANHILLETH, Black Vein Seam, ... Pit.
Shipping Ports—Newport, Cardiff, Barry.
Rail—Great Western, Llanhilleth Station.
Canal— . . . . . .

Western Valley Black Vein Steam Coal.

Class of Coal—Steam.

Large coal—	Per cent.
Carbon	83·64
Hydrogen	4·59
Oxygen	7·01
Nitrogen	1·06
Ash	2·23
Sulphur	0·71
Moisture	0·76
	100·00

The value of the coal in calories is 8,058 with a theoretical evaporative power of 15·0 lb. of water at 100 degs. Cent. per 1 lb. of the coal.

Analyst—George R. Thompson.

Date of Analysis—May 15, 1901.

Notes.

MONMOUTH.

JAS. RICHARDS AND CO.,

Dowlais Chambers, Cardiff.

Colliery—ARGOED (Mon.), Mynyddislwyn Seam, Two Levels Pit.
Shipping Ports—Cardiff, Newport.
Rail—L. and N. W., Argoed Station, Monmouthshire.
Canal—*Nil.*

Argoed Red Ash Coal.

Class of Coal—Highly bituminous coal, suitable for Gas, Manufacturing, House, Coking.

	Per cent.
Ash	3·03
Volatile matter	32·50
Fixed carbon	64·47
	100·00

Moisture	1·10 per cent.
Coke (= 13½ cwt. per ton of coal)	67·50 per cent.
Sulphur	1·42 per cent.
Phosphorus	0·01 per cent.
Quantity of gas per ton of coal	10,221 cubic feet
Illuminating power	16·05 std. candles
Specific gravity	1·281

Analyst—D. N. Roberts.
Date of Analysis—May 1903.

T. F. SALT AND CO. LIMITED.

Gwentland House, Oak Street, Abertillery.

Colliery—RHIW, Colborn Tillery Seam, ... Pit.
Shipping Port—Newport.
Rail—Tin Works Siding, Abertillery, Great Western Railway.
Canal— . . . . . .

Small Coal.

Class of Coal—House, Gas and Smith's Coal.

	Per cent.
Moisture	2·13
Ash	9·70
Volatile matter	31·90
Fixed carbon	56·27
	100·00

Sulphur	1·63 per cent.
Coke	65·97 per cent.

Notes.

MONMOUTH.

The coke produced from this coal is of capital quality, being hard and bright; the yield of dry coke per 1 ton of the coal is 13 cwt. 21 lb.

Upon actual trial the sample yielded 8,858 cubic feet of purified gas at standard pressure and temperature, of illuminating power—13·65 standard candles as determined by London Argand.

This is the net amount, *i.e.*, the total yield, less 12½ per cent. from ordinary laboratory test, but it very closely corresponds to the commercial test.

The sulphur compounds produced upon carbonisation are rather in excess of the ordinary, but sulphuretted hydrogen is the chief, and as such is easily removed in the purifiers.

Analyst—George R. Thompson.

Date of Analysis—March 27, 1906.

TIRPENTWYS BLACK VEIN STEAM COAL AND COKE COMPANY LIMITED,

Pontypool.

Colliery—TIRPENTWYS, Black Vein, Three-quarter, and Big Vein Seams, Nos. 1 and 2 Pits.

Shipping Ports—Newport, Cardiff, Penarth, Barry.

Rail—Great Western, Pontnewynydd Station.

Canal— . . . . .

Black Vein Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

	Per cent.
Carbon	84·86
Hydrogen	4·53
Oxygen	3·21
Nitrogen	0·92
Sulphur	1·17
Ash	5·31
	100·00
Specific gravity	1·34

Notes.

MONMOUTH.

Three-quarter Seam Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

	Per cent.
Carbon	83·88
Hydrogen	4·09
Oxygen	4·67
Nitrogen	0·93
Sulphur	1·40
Ash	5·03
	100·00
Specific gravity	1·309

Big Vein Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

	Per cent.
Carbon	84·39
Hydrogen	5·02
Oxygen	3·16
Nitrogen	0·60
Sulphur	1·79
Ash	5·04
	100·00
Specific gravity	1·319

Analyst—Geo. R. Thompson, F.C.S.

Date of Analysis—February 16, 1894.

Notes.

NORTHUMBERLAND.

ASHINGTON COAL COMPANY LIMITED,

Newcastle-on-Tyne.

Colliery—ASHINGTON, ... Seam, ... Pit.
Shipping Ports—Blyth and the Tyne.
Rail— . . . . . Ashington Station.
Canal— . . . . . .

Ashington Peas Coal.

Class of Coal—Steam.

Fixed carbon	48·97
Volatile hydrocarbons	35·61
Ash	13·70
Sulphur	1·72

Analyst— . . . . . .
Date of Analysis— . . . . . .

Ashington Nut Coals.

Class of Coal— . . . . . .

Yield of gas per ton of coal..	9,500 cubic feet.
Illuminating power	14 std. sp. candles
Coke	12·6 cwt.

Analyst— . . . . . .
Date of Analysis— . . . . . .

Ashington Duff Coal.

(After treatment by coal washer.)

Class of Coal— . . . . . .

	Per cent.
Fixed carbon	55·12
Volatile hydrocarbons	36·80
Ash	7·10
Sulphur	0·98

Analyst— . . . . . .
Date of Analysis— . . . . . .

Notes.

NORTHUMBERLAND.

Bothal West Hartley Coal.

Class of Coal—Steam.

	Per cent.
Carbon	80·90
Hydrogen	5·33
Nitrogen	0·96
Oxygen	9·64
Sulphur	0·77
Ash	2·40

Calorific power of coal, 7,955 cal.

Water evaporated from the boiling point by 1 lb. of coal, 14·66 lb.

Analyst—John Pattinson.

Date of Analysis— . . . . . .

Colliery—ASHINGTON, Low Main Seam, Ashington Pit.

Bothal West Hartley Low Main Coal.

Class of Coal—Steam.

	Per cent.
Carbon	82·05
Hydrogen	4·78
Oxygen	9·32
Nitrogen	1·02
Sulphur	0·78
Ash	2·05
Volatile matter at a red heat ..	37·7

Amount of water lost by drying the sample at 212 degs. Fahr., 6·40 per cent.

Calorific power: Water evaporated from 212 degs. Fahr., by 1 lb. of the coal, 15·1 lb.

The Bothal coal is adjudged one of the best steam coals produced in Northumberland, being included in what are termed the "first three." It is largely sold to the Swedish State Railways.

Analysis made on sample when dried at 100 degs. Cent.

Analyst—John Pattinson, F.I.C., F.C.S.

Date of Analysis— . . . . . .

NORTHUMBERLAND. *Notes.*

OWNERS OF BENTINCK WEST HARTLEY COLLIERY,

Newcastle-on-Tyne.

Colliery—PEGSWOOD (Morpeth), Low Main, Five-quarter, Yard, &c., Seams, Pegswood Pit.

Shipping Ports—Blyth, Tyne and Wear.

Rail—North Eastern, Pegswood Station.

Canal—*Nil.*

Bentinck West Hartley Steam Coals.

Class of Coal—Best Steam, Bunker, and House Coals.

Analysis made on sample when dried at 100 degs. Cent.

	Per cent.
Carbon	80·18
Hydrogen	5·31
Nitrogen	1·77
Oxygen	9·03
Sulphur	0·97
Ash	2·74
	100·00

Calorific power of coal, being weight of water heated from 0 deg. Cent. to 1 deg. Cent. by 1 lb. of coal, 7,916 lb.

Weight of water capable of being evaporated from 100 degs. Cent. by 1 lb. of coal, 14·74 lb.

Analyst—W. W. Proctor.

Date of Analysis—November 13, 1895.

BROOMHILL COLLIERIES LIMITED,

Collingwood Buildings, Newcastle-on-Tyne.

Colliery—BROOMHILL, ... Seam, ... Pit.

Shipping Port—Amble.

Rail—North Eastern, Amble Station.

Canal—*Nil.*

Broomhill West Hartley Coal.

Class of Coal—Steam, Manufacturing, House.

	Per cent.
Carbon	77·45
Hydrogen	4·93
Nitrogen	1·74
Oxygen	7·99
Sulphur	0·72
Ash	1·52
Moisture	5·65

Analysts—J. and H. S. Pattinson.

Date of Analysis—December 17, 1895.

Notes.

NORTHUMBERLAND.

Broomhill Small Coal.

Class of Coal—Steam, Manufacturing, House.

Gave the following result by experiment:—

	Per cent.
Coke	74·20
Volatile matters	25·80

Analyst—J. and H. S. Pattinson.
Date of Analysis—December 17, 1895.

BURRADON AND COXLODGE COAL COMPANY LIMITED,

Watergate Buildings, Newcastle-on-Tyne.

Colliery— . . . . . Seam,
Burradon, Coxlodge, Hazlerigg, Killingworth and Weetslet Pits.
Shipping Ports—Wallsend-on-Tyne, Commissioners' Spouts, Howdon and Albert Edward Docks, Dunston and Tyne Dock.
Rail—North Eastern, Stations all over.
Canal— . . . . . .

Bower's West Hartley Steam Coal.

Class of Coal—Steam.

	Per cent.
Carbon	80·62
Hydrogen	5·10
Oxygen	6·92
Nitrogen	1·51
Sulphur	0·69
Ash	2·46
Water	2·70
	100·00
Non-volatile matters (coke)	67·9
Volatile matters, including water, expelled at red heat in a closed vessel	32·1
	100·0

Calorific power: Pounds of water evaporated from 212 degs. Fahr. by 1 lb. of the coal, as ascertained in Thompson's calorimeter .. .. 14·6 lb.

Analysts—J. and H. S. Pattinson.
Date of Analysis—November 13, 1903.

NORTHUMBERLAND.

Notes.

Another analysis gave the following result :—

	Per cent.
Carbon	80·75
Hydrogen	5·70
Oxygen	6·79
Nitrogen	2·24
Sulphur	0·78
Ash	2·10
Moisture	1·64
	100·00

Coke assay—

Coke	66·8
Volatile matters	33·2

Calorific power of coal in heat units (weight of water capable of being heated from 0 deg. Cent. to 1 deg. Cent. by 1 lb. of the coal) .. .. 7,956·3 lb.

Water evaporated from 100 degs. Cent. by 1 lb. of the coal 14·62 lb.

(Calorific power estimated by Thompson's calorimeter.)

Analyst—W. H. Blake.

Date of Analysis—December 11, 1903.

COWPEN COAL COMPANY LIMITED,

Blyth.

Colliery— . . . . . Low Main and Yard Seams, North Seaton, Cambois, Cowpen and Newsham Pits.

Shipping Port—Blyth.

Rail— . . . . . Station.

Canal— . . . . . .

Cowpen West Hartley Coal.

Class of Coal—Steam.

This coal is also one of the "first three" Northumberland qualities, and is considered a standard north-country steam coal.

	Per cent.
Carbon	79·46
Hydrogen	4·89
Oxygen	11·07
Nitrogen	1·02
Sulphur	0·83
Ash	2·73
	100·00

Moisture (when dried at 100 degs. Cent.).. 8·17

Notes.

NORTHUMBERLAND.

Cowpen West Hartley Coal- *cont.*

Assay for coke—	Per cent.
Coke	68 27
Volatile matters	31·73

Calorific power of coal in Centigrade heat units (being weight of water capable of being heated from 0 to 1 degree Centigrade by 1 lb. of coal) = 7,627 lb.

Water capable of being evaporated from 100 degs. Cent. by 1 lb. of coal = 14·2 lb.

Analyst—W. W. Proctor.

Date of Analysis—May 1, 1901.

ELSWICK COAL COMPANY LIMITED,

Newcastle-on-Tyne.

Colliery—ELSWICK, Brockwell Seam, Elswick and North Elswick Pits.

Shipping Port—River Tyne (above bridge) at Elswick Private Staith.

Rail— . . . . . , ... Station.

Canal— . . . . . .

Elswick Gas Coal.

Class of Coal—Gas, Coking, Manufacturing, and House (latter not for shipment.)

Brockwell Seam.

On submitting the sample to distillation in a coal-testing apparatus, 10,000 cubic feet of gas were obtained per ton of coal, having an illuminating power equal to 16·3 standard sperm candles when burning at the rate of 5 cubic feet per hour, through Sugg's No. 1 London Argand burner.

The coke assay gave as follows:—	Per cent.
Coke	71·9
Volatile matters	28·1
	100·0

There is a high yield of coke of good quality.

A complete "ultimate" analysis of the coal was made, and the following results obtained:—

	Per cent.
Carbon	81·93
Hydrogen	4·85
Oxygen	6·47
Nitrogen	0·69
Sulphur	0·65
Ash	3·86
Water	1·55
	100·00

The above results show that this is a very pure sample of coal.

Analyst—Jno. Pattinson, F.I.C., F.C.S.

Date of Analysis— . . . . . .

NORTHUMBERLAND.

Notes.

Colliery—ELSWICK, Tilley Seam, Elswick and North Elswick Pits.

Tilley Seam Coal.

Class of Coal—Gas, Coking and Manufacturing.

Analysis of a sample of Tilley seam coal sampled by me at Elswick Colliery for the Elswick Coal Company Limited, Newcastle-on-Tyne.

The assay gave results as follows :—

	Per cent.
Coke	72·50
Volatile matter	27·50

The coke was silvery grey in colour, hard, fibrous, and of good cell structure.

Illuminating gas, per ton	10,500 cubic feet
Illuminating power of gas	18·90 std. sp. candles
Sperm value	680·4 lb.
Moisture	1·08 per cent.
Sulphur	0·72 per cent.
Ash	2·80 per cent.

Analyst—W. H. Blake, F.C.S.

Date of Analysis— . . . . . .

Colliery—ELSWICK, Three-quarter Seam, Elswick and North Elswick Pits.

Three-quarter Seam Coal.

Class of Coal—Gas, Coking and Manufacturing.

	Per cent.
Coke	72·50
Volatile matter	27·50

The coke was good, hard, grey, fibrous and of good cell structure.

Illuminating gas per ton	10,500 cubic feet
Illuminating power of gas	18·90 standard sperm candles
Sperm value	680·4 lb.
Moisture	1·08 per cent.
Sulphur	0·72 per cent.
Ash	2·80 per cent.

Analyst—W. H. Blake, F.C.S.

Date of Analysis— . . . . . .

Notes.

NORTHUMBERLAND.

NORTH WALBOTTLE COAL COMPANY LIMITED,

10, Queen Street, Quayside, Newcastle-on-Tyne.

Colliery—NORTH WALBOTTLE, Beaumont Seam, Betty Pit.

Shipping Ports—Dunston, Tyne Dock, Albert Edward and Howdon Docks, Commissioners' Spouts.

Rail—North Eastern, Lemington on Tyne Station.

Canal— . . . . . .

Whorlton Wallsend House Coal.

Class of Coal—House.

Moisture determined by drying at 212 degs. Fahr., 4·37 per cent. Analysis made on sample when dried at 212 degs. Fahr.:—

	Per cent.
Carbon	84·50
Hydrogen	5·15
Nitrogen	1·43
Oxygen	6·93
Sulphur	0·63
Ash	1·36
	100·00

Calorific power of coal in Centigrade heat units, being weight of water heated by 1 lb. of coal from 0 deg. Cent. to 1 deg. Cent.	8,303 lb.
Water heated from 32 degs. Fahr. to 33 degs. Fahr. by 1 lb. of coal	14,946 lb.
Evaporative power of coal, being pounds of water capable of being evaporated from 100 degs. Cent. (212 degs. Fahr.) by 1 lb. of coal	15·46 lb.

Analyst—W. W. Proctor.

Date of Analysis—July 28, 1897.

NORTHUMBERLAND.

Notes.

Whorlton Hartley Steam Coal.

Class of Coal—Steam.

Moisture by drying the sample at 212 degs. Fahr .. 3·14 per cent.

Analysis made on sample when dried at 212 degs. Fahr. :—

	Per cent.
Carbon	82·14
Hydrogen	5·05
Nitrogen	1·18
Oxygen	6·80
Sulphur	1·17
Ash	3·66
	100·00

Calorific power of coal in Centigrade heat units, being weight of water heated by 1 lb. of coal from 0 deg. Cent. to 1 deg. Cent. .. .. 8,081 lb.

Water heated from 32 degs. F. to 33 degs. F. by 1 lb. of coal .. 14,546 lb.

Evaporative power of coal, being pounds of water capable of being evaporated from 100 degs. Cent. (212 degs. Fahr.) by 1 lb. of coal .. .. 15·05 lb.

Analyst—W. W. Proctor.

Date of Analysis—July 28, 1897.

Whorlton Gas Coal.

Class of Coal—Gas.

Quantity of gas per ton of coal	10,500 cubic feet
Illuminating power of gas	17 standard candles
Tested by the No. 1 London standard Argand burner.	
Coke per ton of coal	1,524 lb.
Coke	68 per cent.
Volatile matter	32 per cent.

Appearance of coke fairly good. This is an excellent sample of coal for gas-making purposes.

Analyst—W. W. Proctor.

Date of Analysis—September 22, 1898.

Notes.

NORTHUMBERLAND.

U. A. RITSON AND SONS LIMITED,

Milburn House, Newcastle-on-Tyne.

Colliery—Preston, ... Seam, ... Pit.

Shipping Ports—Northumberland Dock, Albert Edward Dock, and Commissioners' Staiths.

Rail—North Eastern, North Shields Station.

Canal— . . . . . .

Preston West Hartley Steam Coal.

Class of Coal—Steam.

Water, determined by drying at 100 degs. Cent. = 6·48 per cent. Analyses made on sample when dried at 100 degs. Cent.:—

	Per cent.
Carbon	77·17
Hydrogen	4·58
Oxygen	13·20
Nitrogen	1·83
Sulphur	0·93
Ash	2·29
	100·00

Calorific power of coal in Centigrade heat units, being pounds of water heated from 0 deg. Cent. to 1 deg. Cent. by 1 lb. of coal = 8,062. Pounds of water capable of being evaporated from 100 degs. Cent. by 1 lb. of coal = 15.

Analyst—W. W. Proctor.

Date of Analysis—April 10, 1899.

NORTHUMBERLAND.

Notes.

SEATON BURN COAL COMPANY LIMITED,

4, Lombard Street, Newcastle-on-Tyne.

Collieries—SEATON BURN and DINNINGTON . . . . . Seam.
. . . . . Pit.

Shipping Ports—Tyne, Blyth, and Wear, also Private Staiths in River Tyne.

Rail—North Eastern, Killingworth Station.

Canal— . . . . . .

Ravensworth West Hartley Steam Coal.

Class of Coal—Steam.

	Per cent.
Carbon	75·05
Hydrogen	4·91
Oxygen	7·87
Nitrogen	1·80
Sulphur	1·04
Ash	1·86
Water	7·47
Coke assay—	
Coke	57·5
Volatile matters	42·5

Calorific power: Water evaporated from 212 degs. Fahr. by 1 lb. of the coal, 13·7 lb.

Another analysis gave the following results :—

	Per cent.
Carbon	75·05
Hydrogen	4·78
Oxygen	8·01
Nitrogen	1·83
Sulphur	0·67
Ash	1·40
Water	8·26
Coke assay—	
Coke	58·7
Volatile matters	41·3

Calorific power: Water evaporated from 212 degs. Fahr. by 1 lb. of the coal, 13·7 lb.

Analysts—J. and H. S. Pattinson.

Date of Analysis—March 11, 1901.

Notes.

NORTHUMBERLAND.

Wharncliffe Wallsend Household Coal.

Class of Coal—House.

	Per cent.
Carbon	75·93
Hydrogen	4·84
Oxygen	7·91
Nitrogen	1·75
Sulphur	0·54
Ash	1·70
Water	7·33
Coke	58·3
Volatile matters	41·7

Analysts—J. and H. S. Pattinson.
Date of Analysis—March 11, 1901.

Beaumont Wallsend Coal.

Class of Coal—House.

Moisture, determined by drying at 100 degs. Cent. (212 degs. Fahr.) equals 3·58 per cent. Analysis on sample when dried at 100 degs. Cent.:—

	Per cent.
Carbon	80·33
Hydrogen	5·03
Nitrogen	1·18
Oxygen	9·64
Sulphur	0·63
Ash	3·19
	100·00

Calorific power of coal, in Centigrade heat units, being pounds of water heated by 1 lb. of coal from 0 deg. Cent. to 1 deg. Cent. equals	7,808 lb.
Pounds of water heated from 32 degs. Fahr. to 33 degs. Fahr. by 1 lb. of coal equals	14,054 lb.
Evaporative power of coal, being pounds of water capable of being evaporated from 100 degs. Cent. (212 degs. Fahr.) by 1 lb. of coal equals	14·54 lb.

This is a nice clean sample of house coal, almost free from sulphur, and yielding not much ash of a reddish colour. It is a good coal for household and other heating purposes.

Analyst—W. W. Proctor, F.I.C.
Date of Analysis—September 17, 1901.

NORTHUMBERLAND.

Notes.

SEATON DELAVAL COAL COMPANY LIMITED,

Newcastle-on-Tyne.

Colliery—Seaton Delaval.

Shipping Port—Northumberland Dock, Tyne.

Rail—Seaton Delaval Station.

Canal— . . . . . .

Hastings Hartley Main Steam Coal.

Class of Coal—Steam.

Analysis made on sample when dried at 100 degs. Cent. :—

	Per cent.
Carbon	79·63
Hydrogen	5·05
Nitrogen	1·02
Oxygen	10·75
Sulphur	0·75
Ash	2·81
	100·00

Assay for coke :—

Coke	65·83
Volatile matters	34·17
	100·00

Calorific power of coal in Centigrade heat units, being pounds of water heated from 0 deg. Cent. to 1 deg. Cent. by 1 lb. of coal, 7,709 lb. Pounds of water capable of being evaporated from 100 degs. Cent. by 1 lb. of coal, 14·35 lb.

Analyst—W. W. Proctor.

Date of Analysis—February 22, 1886.

Notes.

NORTHUMBERLAND.

STOBSWOOD COAL COMPANY,

9, Sandhill, Newcastle-on-Tyne.

Colliery—STOBSWOOD, Main Seam, Stobswood Pit.
Shipping Ports—Blyth, Amble, Howdon Dock, Commissioners' Spouts, Dunston and Tyne Dock.
Rail— . . . . . Widdrington Station.
Canal— . . . . . .

Northumberland West Hartley Steam Coal.

Class of Coal—Steam.

Sample dried at 212 degs. Fahr.—	Per cent.
Carbon	80·66
Hydrogen	5·15
Oxygen	9.02
Nitrogen	0·80
Sulphur	0·57
Ash	3·80
	100·00

Water lost by drying the sample at 212 degs. F. 4·24 per cent.

Calorific power as determined by Thompson's calorimeter, pounds of water evaporated from 212 degs. Fahr. by 1 lb. of the coal .. 13·9 lb.

Analysts—J. and H. S. Pattinson.
Date of Analysis—March 11, 1880.

WALLSEND AND HEBBURN COAL COMPANY LIMITED,

Newcastle-on-Tyne.

Collieries—WALLSEND (Northumberland) and HEBBURN (Durham), Hudson and Bensham Seams, ... Pit.
Shipping Ports—Private Staiths, River Tyne and Docks.
Rail—North Eastern, Hebburn Station.
Canal— . . . . . .

Hebburn Main Gas Coal.

Class of Coal—Gas, Manufacturing.

Three samples were analysed with following results :—

Yield of gas per ton of coal.	10·600	10·800	10·600	cubic feet
Illuminating power of gas .	16·5	17·0	16·6	std. candles

NORTHUMBERLAND.

Notes.

These results were obtained on submitting the coals to distillation in a coal-testing apparatus, and by burning the gas so obtained at the rate of 5 cubic feet per hour in a photometer fitted with the No. 1 London Argand standard burner.

The coals yielded the following percentage amounts of coke and volatile matters:

	Per cent.	Per cent.	Per cent.
Coke	69·5 ..	68·2 ..	70·1
Volatile matters	30·5 ..	31·8 ..	29·9
	100·0 .	100.0 ..	100·0

All the coals coked well, and are good for gas-making purposes.

The above samples were taken from three different parts of the mines.

Analysts—J. and H. S. Pattinson.

Date of Analysis—August 7, 1900.

WANSBECK COLLIERY COMPANY LIMITED,

A, Exchange Buildings, Newcastle-on-Tyne.

Colliery—WANSBECK, ... Seam, Moorpeth Moor Pit.

Shipping Ports—Blyth, Dunston, and Northside of Tyne.

Rail—North Eastern, Morpeth Station.

Canal— . . . . . .

"Little Seam" Nuts, "Old Man's Seam" Unscreened.

Class of Coal— . . . . . .

	"Little Seam." Nuts.	"Old Man's Seam." Unscreened.
Yield of gas per ton of coal in cubic feet	10,700 ..	10,600 cubic feet
Illuminating power of gas in standard sperm candles	15·9 ..	15·3 std. candles
Illuminating value of gas, expressed in lbs. of sperm per ton of coal	583 ..	556 lb. sperm

The coals yielded the following percentage of coke and volatile matters:—

	Per cent.	Per cent.
Non-volatile matters (coke)	61·1 ..	61·8
Volatile matters, including water, expelled at a temperature of 1,000 degs. Cent. in a closed vessel	38·9 ..	38·2
	100·00	100·00

Notes.

NORTHUMBERLAND.

"Little Seam" Nuts, "Old Man's Seam" Unscreened—*cont.*

A complete ultimate analysis was made of each coal, and the following results were obtained :—

	"Little Seam." Nuts. Per cent.	"Old Man's Seam." Unscreened. Per cent.
Carbon	67·64	70·47
Hydrogen	4·67	4·42
Oxygen	7·82	7·49
Nitrogen	1·20	1·26
Sulphur	1·54	1·61
Ash	11·77	8·34
Water	5·36	6·41
	100·00	100·00

Calorific powers :—

Pounds of water evaporated from 212 degs. Fahr. by 1 lb. coal	12·5 lb.	12·8 lb.

Both these coals are fairly good gas coals, and when treated for gas they leave a fairly good, though not very hard, coke. They are both free-burning, long-flame coals, and could be used either for steam-raising or for household purposes, though the calorific values are not high enough for a steam coal of the first grade, and the nuts contain rather a high percentage of ash.

Analysts—J. and H. S. Pattinson.

Date of Analysis—March 16, 1906.

NOTTINGHAM.

Notes.

BESTWOOD COAL AND IRON COMPANY LIMITED,

near Nottingham.

Colliery—BESTWOOD, Top Hard Seam, ... Pit.

Shipping Ports—Boston, Lynn, Hull, Grimsby.

Rail—Midland, Great Northern, Great Central, and L. and N. W., Bestwood Colliery Station.

Canal— . . . . . .

Bestwood Top Hard Steam Coal.

Class of Coal—Steam, Manufacturing, House.

The following is an analysis of a sample of Bestwood best double-screened and hand-picked steam coals.

	Per cent.
Fixed carbon	55·80
Volatile matter	31·15
Moisture	8·26
Ash	4·79
Sulphur	0·73
Calorific power in pound degs. Cent. per pound of coal burnt	7706 lb.
Water at 212 degs. Fahr. converted into steam at 212 degs. Fahr. by 1 lb. coal	14·36 lb.

Analyst—L. T. O'Shea.

Date of Analysis—December 21, 1905.

CLIFTON COLLIERY COMPANY,

Nottingham.

Colliery—CLIFTON, Deep Hard Seam, Clifton Nos. 1 and 2 Pits.

Shipping Ports—Hull, Grimsby, Boston, Lynn and Partington.

Rail—Midland, Great Central, Great Northern and L. and N. W., Nottingham Station.

Canal—Trent Navigation.

Picked Hards.

Class of Coal—Steam.

	Per cent.
Carbon	74·04
Ash	6·16
Hydrogen	4·80
Nitrogen	1·06
Sulphur	1·02
Oxygen	12·92
	100·00
Evaporative power..	12·47 lb.

Analyst—S. R. Trotman.

Date of Analysis— . . . . , 1905.

Notes.

NOTTINGHAM.

Large Cobbles.

Class of Coal—Steam, Manufacturing.

	Per cent.
Carbon	74·60
Ash	4·30
Hydrogen	5·06
Nitrogen	0·96
Sulphur	1·13
Oxygen	13·95
	100·00

Evaporative power .. .. 12·6 lb.

Analyst—S. R. Trotman.

Date of Analysis— . . . , 1905.

Cannel.

Class of Coal—Gas.

	Per cent.
Carbon	71·77
Hydrogen	6·12
Nitrogen	0·49
Oxygen	11·87
Sulphur	1·45
Ash	8·30
	100·00

Make of gas at N.T.P.	12,800 cubic feet
Illuminating power of gas	23·4 candles
Yield of coke per ton	$9\frac{3}{4}$ cwt.
Quality	Fair cannel coke

Analyst—S. R. Trotman.

Date of Analysis— . . . , 1905.

NOTTINGHAM.

Notes.

Colliery—CLIFTON, Deep Soft Seam, Nos. 1 and 2 Pits.

Small Bright Nuts.

Class of Coal—Gas, Steam, Manufacturing, House.

	Per cent.
Carbon	72·46
Hydrogen	4·20
Nitrogen	1·10
Oxygen	15·17
Sulphur	1·23
Ash	5·84
	100·00

Make of gas per ton at N.T.P.	10,610 cubic feet
Illuminating power of gas	13·98 candles
Yield of coke per ton	12 cwt.
Quality of coke	Fair

Analyst—S. R. Trotman.

Date of Analysis— . . . . , 1905.

Bright Pea Nuts.

Class of Coal—Steam, Manufacturing, House.

	Per cent.
Carbon	71·18
Hydrogen	4·55
Nitrogen	0·83
Oxygen	14·06
Sulphur	1·88
Ash	7·50
	100·00

Make of gas per ton at N.T.P.	10,050 cubic feet
Illuminating power of gas	14·2 candles.
Yield of coke per ton	10¼ cwt.

Analyst—S. R. Trotman.

Date of Analysis— . . . . , 1905.

Notes.

NOTTINGHAM.

DIGBY COLLIERY COMPANY LIMITED,

Digby Collieries, near Nottingham.

Collieries—DIGBY, Bottom Soft and Bottom Hard Seams; GEDLING, Top Hard and High Hazel Seams, ... Pit.

Shipping Ports—Lynn, Boston, Hull, Grimsby.

Rail—Midland, Great Northern, L. and N. W., Great Central, Kimberley and Gedling Stations.

Canal—Nottingham and Grantham, 3 miles from Langley Mill.

Digby and Gedling House Coals.

Class of Coal—House.

	Derby Main Bright.	Giltbrook Bright.	Gedling High Hazel or Ashless.
Carbon	77·30	78·20	79·04 per cent.
Hydrogen	4·77	4·74	5·75 per cent.
Nitrogen	1·47	1·45	0·98 per cent.
Oxygen	13·85	12·19	11·77 per cent.
Sulphur	1·23	1·40	1·06 per cent.
Ash	1·38	2·02	1·40 per cent.
	100·00	100·00	100·00

Digby and Gedling Large Steam or Furnace Hards.

Class of Coal—Blast Furnace, Steam, Manufacturing.

	Digby Picked Hard.	Gedling Picked Hard.
Carbon	75·09	76·15 per cent.
Hydrogen	4·51	3·19 per cent.
Oxygen	12·13	11·98 per cent.
Nitrogen	1·21	0·99 per cent.
Sulphur	0·69	0·86 per cent.
Ash	6·37	6·83 per cent.
	100·00	100·00
Coke	60·1	69·75 per cent.
Volatile matter	39·9	30·25 per cent.
Moisture	8·37	4·30 per cent.
Calorific value in B.T.U.'s	13,030	14,037 B.T.U.

NOTTINGHAM. *Notes.*

Digby and Cedling Nuts for Steam.

Class of Coal—Steam.

	Digby Pea Nuts, from Main Bright.	Digby Pea Nuts, from Giltbrook.	Gedling Small Nuts, from Top Hard.	Gedling Small Nuts, from High Hazel or Ashless coal.
Water	7·73	4·73	7·92	10·81 per cent.
Ash	3·86	2·10	4·32	1·38 per cent.
Sulphur	1·49	0·94	1·01	1·07 per cent.
Calorific value in B.T.U.'s	13,781	14,995	13,990	14,000 B.T.U.

Analyst—S. R. Trotman, M.A., F.I.C.

Date of Analysis—May 1906.

SHERWOOD COLLIERY COMPANY,

Mansfield.

Colliery—SHERWOOD, Top Hard Seam, Sherwood Pit.

Shipping Port— . . . . . .

Rail—Midland, Mansfield-Woodhouse Station.

Canal—*Nil.*

Bright Coal.

Class of Coal—Steam, Manufacturing, House.

	Per cent.
Proximate composition—	
Fixed carbon	54·18
Volatile constituents	34·24
Ash	2·08
Water (expelled at 212 degs. Fahr.)	9·50
	100·00
Coke	56·26
Ultimate composition—	
Carbon	72·44
Hydrogen	5·26
Oxygen	7·80
Nitrogen	1·71
Sulphur	1·21
Ash	2·08
Water (expelled at 212 degs. Fahr.)	9·50
	100·00

Notes.

NOTTINGHAM.

Bright Coal—*cont.*

Calorific value--

This, as determined by Thompson's calorimeter, and expressed in British thermal units, is	12,058 B.T.U.
That is to say, 1 lb. of coal would be capable of evaporating 12·4 lb. of water at	212 degs. Fahr.

Analysts—The "Quarry" Testing, Analysing, and Investigation Department.

Date of Analysis—October 24, 1904.

Best Hard Coal.

Class of Coal—Steam, Manufacturing, House.

	Per cent.
Proximate composition—	
Fixed carbon	57·19
Volatile constituents..	32·30
Ash	2·38
Water (expelled at 212 degs. Fahr.) ..	8·13
	100·00
Coke	59·57
Ultimate composition—	
Carbon	76·10
Hydrogen	5·11
Oxygen	5·84
Nitrogen	1·58
Sulphur	0·86
Ash	2·38
Water (expelled at 212 degs. Fahr.) ..	8·13
	100·00

Calorific value—

This, as determined by Thompson's calorimeter, and expressed in British thermal units, is	12,348 B.T.U.
That is to say, 1 lb. of coal would be capable of evaporating 12·8 lb. of water at	212 degs. Fahr.

Analysts—The "Quarry" Testing, Analysing, and Investigation Department.

Date of Analysis—October 24, 1904.

NOTTINGHAM. *Notes.*

STANTON IRONWORKS COMPANY,

Teversal, Mansfield.

Colliery—TEVERSAL, ... Seam, Silverhill Pit.
Shipping Ports—Hull, Grimsby, Partington, Lynn, Boston.
Rail—Midland, Great Northern, L. and N. W., Great Central, Teversal Station, Midland.
Canal—*Nil.*

Silverhill Main Gas Coal.

Class of Coal—Gas.

A sample of this coal, representing the product of the seam, gave on examination the following results :—

The seam consists of cannel and bituminous coal; all black and possessing very high lustre and brown streak; cannel portion irregular in fracture to semi-conchoidal and curly in cross-fracture, while bituminous portion is highly resinoid in both fractures with slight deposits of charcoal, as also calcic carbonate and ferric bisulphide; moderately cohesive and compact. On the fire it intumesces and partly agglomerates. Colour of ash, brown and flocculent. Mean specific gravity, 1,254 (water, 1,000); weight of 1 cubic foot, 78·37 lb.

		Per cent.
Volatile matter (containing 0·33 of sulphur)		35·54
Coke, consisting of—		
Carbon	57·63	
Sulphur	0·18	
Ash	1·55	
		59·36
Water expelled at 212 degs. Fahr. ..		5·10
		100·00

Gaseous products :—

Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	12,022 cubic feet
Gas from 1 cubic foot of the coal ..	420·60 cubic feet
Specific gravity of the gas	556 (air 1,000)
Hydrocarbons absorbed by bromine ..	6·66 per cent.
Durability of 1 cubic foot by 5 in. jet flame	44 mins. 27 secs.
Value of 1 cubic foot of gas	533·76 grains sperm
Value of gas from 1 ton of coal	919·87 lb. sperm
Illuminating power of gas in standard candles (per London Argand)	22·24 candles
Sulphuretted hydrogen (H_2S) in foul gas	0·75 per cent.
Carbonic acid (CO_2) in foul gas ..	0·80 per cent.
Carbonic oxide (CO) in foul gas	9·00 per cent.
Sulphur eliminated with volatile products	7·45 lb.

Notes.

NOTTINGHAM.

Silverhill Main Gas Coal—*cont.*

Liquid products—

Tar per ton of coal	17·50 gallons
Ammoniacal liquor, per ton of coal ..	19·94 gallons
Strength of ammoniacal liquor	3·00 degs. Twad.
Hygrometric water per ton of coal ..	11·42 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	7·36 per cent.

Solid products—

Coke per ton of coal	1,330·66 lb.
Carbon in the coke	97·40 per cent.
Ash in the coke	2·60 per cent.
Sulphur in coke per ton of coal	4·03 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	13·38 lb.

This coal yields a large volume of gas and 11·88 cwt. of coke of remarkably pure quality. The foul gas at same time contains an exceptionally small amount of impurities. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 72·63.

Analyst—Geo. R. Hislop.

Date of Analysis—February 2, 1895.

Notes.

SHROPSHIRE.

LILLESHALL COMPANY LIMITED,

Priors Lee Hall, Shifnal.

Collieries—DONNINGTON and PRIORS LEE, ... Seam, Various Pits.

Shipping Port—Nil.

Rail—Great Western, L. and N. W., Oakengates and Donnington Stations.

Canal—Shropshire Union.

Flint Coal, Deep Coal.

Class of Coal—House and Manufacturing.

	Flint coal. Per cent.	Deep coal. Per cent.
Fixed carbon	45·59	49·25
Volatile hydrocarbons, &c.	37·07	32·53
Moisture	10·76	14·13
Ash	5·36	3·32
Sulphur	1·22	·77
	100·00	100·00

All the seams are very similar to the above analytically, being high in volatile matter and low in fixed carbon.

Analyst—G. A. Jarvis, F.C.S.

Date of Analysis—June 10, 1905.

Notes.

SOMERSETSHIRE.

DUNKERTON COLLIERIES LIMITED,

Peasedown St. John, near Bath.

Colliery—DUNKERTON, Great Vein Seam, ... Pit.

Shipping Ports—Bristol and Avonmouth.

Rail—Great Western, Camerton Station.

Great Vein Coal.

Class of Coal—Gas and Steam.

The coal was submitted to distillation in a coal-testing apparatus at a temperature of 1,000 degs. Cent., and yielded gas at the rate of 12,400 cubic feet per ton of coal. The gas was burnt in a photometer fitted with the No. 1 London Argand standard burner at such a rate as to give the maximum efficiency of illumination. The proportionate illuminating power of the gas, calculated to the standard rate of consumption of 5 cubic feet per hour, was found to be equal to 16·5 standard sperm candles. The illuminating value of the gas per ton of coal expressed in pounds of sperm is 701.

The coal yielded the following percentage amounts of coke and volatile matters :—

	Per cent.
Non-volatile matters (coke)	60·6
Volatile matters, including water expelled at a temperature of 1,000 degs. Cent. in a closed vessel	39·4

A complete "ultimate" analysis of the coal was made, and the following results were obtained :—

	Per cent.
Carbon	81·64
Hydrogen	5·29
Oxygen	5·12
Nitrogen	1·46
Sulphur	0·67
Ash	4·10
Water	1·72
	100·00

Calorific power: Pounds of water evaporated from 212 degs. Fahr. by 1 lb. of coal.. .. 15·2

This is an excellent coal for gasmaking purposes, having an unusually high sperm value. It is low in ash and sulphur, and has a high calorific value. These qualities fit it well for use as a steam coal.

Analyst—J. and H. S. Pattinson.

Date of Analysis—October 17, 1906.

GREYFIELD COLLIERY COMPANY LIMITED,

Clutton, Bristol.

Shipping Ports—Bristol and Avonmouth.

Rail—Great Western, Clutton Station.

SOMERSETSHIRE.

Notes.

Colliery—GREYFIELD, Dabchick Seam, Greyfield Pit.

Dabchick Vein Coal.

Specific gravity	1·278
Coke (12 cwt. 0 qr. 5 lb.)	60·26 per cent.
Volatile products	32·24 per cent.
Sulphur	1·53 per cent.
Ash	7·50 per cent.
Purified gas per ton	10,837 cubic feet
Sulphuretted hydrogen in crude gas	0·26 per cent.
Carbonic acid in crude gas	1·82 per cent.
Carbonic oxide in purified gas	7·35 per cent.
Illuminating power when burned in the London Argand at the rate of 5 ft. per hour (each 120 grs. per hour)	19·16 candles
Heating power	13·88 lb.
Carbon	84·38 per cent.
Hydrogen	5·15 per cent.
Oxygen	0·73 per cent.
Nitrogen	0·71 per cent.
Value of gas per ton of coal	718·33 lb. sperm

Analyst—Alexander Fiddes.

Date of Analysis—

Miss E. E. JARRETT,

Camerton Collieries, Bath.

Colliery—CAMERTON, ... Seam, ... Pit.

House, Gas, and Steam Coals.

Rail—Great Western, Camerton Station.

Camerton Gas Coal (Block Coal).

Class of Coal—Gas.

Specific gravity of the coal	1·271
Fixed products or coke, 1,462 lb.	65·31 per cent.
Volatile products	34·69 per cent.
Sulphur in the coal	0·95 per cent.
Ash in the coal	3·82 per cent.
Quantity of purified gas per ton at 30 in. bar. and 60 degs. Fahr.	11,180 cubic feet
Sulphuretted hydrogen in the crude gas	0·37 per cent.
Carbonic acid in the crude gas	3·70 per cent.
Hydrocarbons condensable by bromine in the purified gas	6·29 per cent.
Carbonic acid condensable by bromine in the purified gas	4·62 per cent.

Notes.

SOMERSETSHIRE.

Camerton Gas Coal (Block Coal)—*cont.*

The illuminating power of the gas when burned in the London Argand at a rate of 5 cubic feet per hour was equal to the light of 18·74 spermaceti candles, each consuming 120 grains per hour. Value of one ton of coal in pounds of sperm, 718. The heating power of the coal is 14·00, or 1 lb. of this coal by its perfect combustion will convert 14 lb. of boiling water into steam.

Mr. J. Harger Pye, on June 29, 1901, made a working test of partly screened Camerton coal, and found that under favourable circumstances it had produced 11,233 cubic feet of 16-candle power gas, with 1,210 lb. of coke per ton of coals.

Analyst—Alex. H. Fiddes.

Date of Analysis—August 19, 1889.

Camerton Gas Coal (Small Coal).

Class of Coal—Gas.

Specific gravity of the coal (water being 1·000)	1·278
Fixed products, or coke (1,488 lb.)	66·45 per cent.
Volatile products	33·55 per cent.
Sulphur in the coal	1·41 per cent.
Ash in the coal	10·70 per cent.
Purified gas per ton at 30 in. bar. and 60 degs. F.	11,134 cubic feet.
Sulphuretted hydrogen in the crude gas ..	0·58 per cent.
Carbonic acid in the crude gas	3·16 per cent.
Hydrocarbons condensable by bromine in the purified gas	5·84 per cent.
Carbonic oxide in the purified gas	5·57 per cent.

The illuminating power of the gas when burned in the London Argand at a rate of 5 cubic feet per hour was equal to the light of 18·19 spermaceti candles, each consuming 120 grains per hour.

Value of 1 ton of the coal in sperm	694 lb.
Heating power of the coal, or weight of boiling water converted into steam	12·9 lb.

Analyst—Alexander H. Fiddes.

Date of Analysis—August 19, 1887.

Notes.

SOMERSETSHIRE.

SAMBORNE, SMITH & CO.,

Timsbury, Bath.

Colliery—TIMSBURY, ... Seam, Nos. 1 and 2 Pits.
Shipping Port—Avonmouth.
Rail—Great Western, Timsbury Sidings, *via* Hallatrow Station.
Canal— . . . . . .

Timsbury Gas Coal.

Class of Coal—Gas.

I have examined the sample of Timsbury through coal, forwarded on the 17th, and claimed to be a fair sample of the whole section of the seam. It is an excellent gas coal, burning off freely in the retort, and giving a very large yield of high power gas together with a high proportion of coke of hard and good quality.

Specific gravity	1·318
Weight of 1 cubic foot	82 lb. 6 oz.

Proximate analysis—	Per cent.
Loss by exposure to 212 degs. Fahr.	1·60
Sulphur	1·22
Volatile matter	28·38
Fixed carbon	64·08
Ash (light gravel-red colour) ..	4·72
	100·00

Working analysis (per ton of 2,240 lb.)—	
Gas corrected to 60 degs. Fahr. and 30 in. bar.	12,357 cubic feet
Illuminating power	17·2 candles
Coke weighed dry	13 cwt. 88 lb.
Tar..	12 gallons
Liquor	9 gallons
Value of 1 cubic foot	408 grains sperm
Value of 1 ton of coal	727 lb. sperm

Analyst—N. H. Humphrys, A.M.I.C.E., F.C.S., &c.
Date of Analysis—April 27, 1905.

Notes.

STAFFORDSHIRE.

CANNOCK AND RUGELEY COLLIERY COMPANY LIMITED,

Hednesford.

Colliery— . . . . . Deep, Shallow and Six Feet Seam, Cannock Wood Mine Pit.

Shipping Port—Nil.

Rail—L. and N. W. and Midland, Hednesford Station.

Canal—Hednesford Basin.

Deep Seam.

Class of Coal—House and Steam.

	Per cent.
Fixed carbon	52·03
Volatile products	32·97
Ash	1·02
Sulphur	0·50
Moisture	13·48

Shallow Seam.

Class of Coal—House and Steam.

	Per cent.
Fixed carbon	49·08
Volatile products	34·03
Ash	2·78
Sulphur	0·91
Moisture	13·20

Six-feet Seam.

Class of Coal—House and Steam.

	Per cent.
Fixed carbon	48·24
Volatile products	33·59
Ash	3·01
Sulphur	1·06
Moisture	14·10

Analyst—F. Hunting.

Date of Analysis—December 8, 1903.

STAFFORDSHIRE.

Notes.

CHATTERLEY-WHITFIELD COLLIERIES LIMITED,

Tunstall.

Colliery—WHITFIELD, Hard Mine Seam, Middle Pit.

Shipping Ports—Birkenhead, Ellesmere Port, Runcorn, Garston, Partington, Liverpool (Herculaneum Dock).

Rail—North Stafford, Pinnox Junction or Chell Sidings, Tunstall Station.

Canal—Trent and Mersey, Tunstall.

Hard Mine Coal.

Class of Coal—Steam.

	Per cent.
Moisture	4·5
Coke	63·1
Volatile matter	30·2
Ash	2·2
	100·0
Sulphur	0·35

Colour of ash, red grey; calorific power, total units of heat, *i.e.*, pounds of water, heated 1 deg. Cent. by 1 lb. of coal, 8,460; experimental evaporative power of the coal as determined by Thompson's calorimeter, *i.e.*, pounds of water at 100 degs. Cent. converted into steam per 1 lb. of coal, 15·7 lb.

Analyst—Wm. Jas. Orsman.

Date of Analysis—November, 1894.

Colliery—WHITFIELD, Holly Lane Seam, Middle Pit.

Holly Lane Coal (Best House-fire Coal).

Class of Coal—House.

	Per cent.
Water expelled at 212 degs. Fahr.	3·4
Volatile hydrocarbons	31·6
Fixed carbon	62·6
Ash	1·6
Sulphur	0·8
	100·0

Percentage of coke in coal	64·2 per cent.
Coke per ton of coal	1,438 lb.
Colour of ash	Light brown

Analyst—Wm. Jas. Orsman.

Date of Analysis—March 16, 1904.

Notes.

STAFFORDSHIRE.

Colliery—WHITFIELD, Cockshead Seam, Institute Pit.

Cockshead Coal.

Class of Coal—House and Steam.

	Per cent.
Water expelled at 212 degs. Fahr.	1·7
Volatile hydrocarbons	30·9
Fixed carbon	64·3
Ash	2·5
Sulphur	0·6
	100·0

Percentage of coke	66·8 per cent.
Coke per ton of coal	1,496 lb.
Colour of ash	Light brown
Calorific power	7,947
Experimental evaporative power	14·7 lb.

Analyst—Wm. Jas. Orsman.
Date of Analysis—January 7, 1904.

HAMSTEAD COLLIERY COMPANY LIMITED,

Great Barr, Birmingham.

Colliery—HAMSTEAD, Thick Coal Seam, ... Pit.
Shipping Port— . . . . . .
Rail—L. and N. W., Great Barr Station.
Canal—Birmingham.

House Coal.

Class of Coal—House.

	Per cent.
Moisture	11·13
Fixed carbon	51·56
Volatile matter	35·81
Ash	1·50
	100·00

Analyst—Wm. Charlton.
Date of Analysis—December 1905.

STAFFORDSHIRE.

Notes.

MIDLAND COAL, COKE AND IRON COMPANY LIMITED,

Newcastle-under Lyme.

Colliery—PODMORE HALL, Ten-feet Seam, ... Pit.

Shipping Ports—Garston, Liverpool, Birkenhead, Partington, Runcorn, Ellesmere Port, Widnes.

Rail—North Stafford, Newcastle Station, Sidings at Podmore Hall Colliery.

Canal— . . . . . .

Best Ten-feet Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

The general appearance of the coal is shiny black, large, hard, irregular, and clean. Shows numerous bright button-like facets. Main fracture irregular, exposing bright shiny black coal, interspersed with soft woody carbon. Cross-fracture, irregular, bright.

Specific gravity	1·274
Weight of 1 cubic foot	79·63 lb.
Space occupied by 1 ton	28·12 cubic feet
Proximate analysis :—	
Moisture	1·03 per cent.
Volatile products	33·07 per cent.
Fixed carbon	63·59 per cent.
Sulphur	1·19 per cent.
Ash	1·12 per cent.
Commercial analysis—	
Gas per ton of coal	11,592 cubic feet
Gas per cubic foot of coal	412 cubic feet
Illuminating power in standard sperm candles	18·62 candles
Value of 1 cubic foot of the gas in sperm	447 grains
Sperm value per ton of coal	740 lb.
Coke per ton of coal (excellent)	12·97 cwt.
Coke per cent. of coal	64·86 per cent.
Ash in the coke (colour, dull brown) ..	1·73 per cent.
Sulphur eliminated with the volatile products	11·37 lb.
Sulphur in the coke	15·38 lb.
Tar per ton of coal	14·83 gallons
Ammonia liquor per ton of coal	22·16 gallons

Analyst—R. O. Paterson.

Date of Analysis—February 24, 1905.

Notes.

STAFFORDSHIRE.

Colliery—APEDALE, Seven-feet Seam, ... Pit.
Shipping Port— . . . . . .
Rail— . . . . . Railway Sidings at Colliery.
Canal— . . . . . .

Best Seven-feet Coal.

Class of Coal—Gas Steam, Manufacturing, House.

The general appearance of the coal is dull black, hard, irregular. Shows small bright shiny facets. Main fracture uneven, exposing bright coal slightly interspersed with soft woody carbon. Cross fracture irregular with traces of carbonate of lime and pyrites.

Specific gravity	1·276
Weight of 1 cubic foot	79·75 lb.
Space occupied by 1 ton	28·08 cubic feet
Proximate analysis—	Per cent.
Moisture	1·28
Volatile products	37·07
Fixed carbon	57·44
Sulphur	2·09
Ash	2·12
	100·00
Commercial analysis—	
Gas per ton of coal	11,662 cubic feet
Gas per cubic foot of coal	415 cubic feet
Illuminating power in standard sperm candles	18·42 candles
Value of 1 cubic foot of the gas in sperm	442 grains
Sperm value per ton of coal	736 lb.
Coke per ton of coal (good)	12·19 cwt.
Coke per cent. of coal	60·94 per cent.
Ash in the coke (colour dark red) ..	3·48 per cent.
Sulphur eliminated with volatile products	21·21 lb.
Sulphur in the coke..	25·53 lb.
Tar per ton of coal	16·25 gallons
Ammoniacal liquor per ton of coal ..	28·60 gallons

Analyst—R. O. Paterson.

Date of Analysis—February 24, 1905.

STAFFORDSHIRE.

Notes.

PARK HALL COLLIERIES LIMITED,

Longton.

Colliery— . . . . . Seam, Park Hall Pit.
Shipping Ports—Partington Tips and Herculaneum Docks, Birkenhead.
Rail—North Stafford, Weston Coyney Siding.
Canal— . . . . . .

Park Hall Steam Coal.

Class of Coal—Steam.

We have carefully examined the sample of coal you submitted to us on the 29th ult. and now send you the result of our analysis:

Coke assay—	Per cent.
Volatile matter	39·27
Coke	60·73
	100·00

	Per cent.
Fixed carbon	58·17
Volatile matters other than sulphate and water	31·70
Sulphur	0·67
Ash	2·23
Water	7·23
	100·00

Ultimate analysis:—	On sample as received. Per cent.	On water-freed sample. Per cent.
Carbon	75·94	81·86
Hydrogen	5·20	5·61
Oxygen	7·58	8·17
Nitrogen	1·15	1·24
Sulphur	0·67	0·72
Ash	2·23	2·40
Water	7·23	0·00
	100·00	100·00

These results indicate that this is a sample of coal of high-class quality for steam-raising and general purposes. The proportion of volatile matter and coke are very satisfactory, and the percentage of ash and sulphur exceptionally low.

Analyst—A. Norman Tate and Co.

Date of Analysis—February 7, 1894.

Notes.

STAFFORDSHIRE.

Park Hall Gas Coal.

Class of Coal—Gas.

Analysis for gasmaking purposes of sample of coal received from the Park Hall Collieries, Longton, North Staffordshire, May 30, 1894.

The coal contains—	Per cent.	In lb. per ton.
Moisture (given off at 212 degs. F.)	5·64	126·336
Volatile matter (at red heat)	38·24	856·576
Fixed matter (coke and ash)	56·12	1,257·088
	100·00	2,240·000
Containing ash	2·39	53·53
Total sulphur in coal	1·12	25·08
Analysed in a model gas apparatus, $\frac{1}{100}$ ton, or 22·4 lb. of coal, give—		
Tar	12·98	290·625
Ammoniacal liquor, 2·2 degs. Twad., 4·4 oz. strength	14·64	328·120
Containing real ammonia	0·91	20·38
Coke	56·92	1,275·00
Yield of gas per ton (bar. 30 in., temp. 60·0 degs. Fahr.)	10,512·5 cubic feet	
Illuminating power of gas per 5 cubic feet of gas	17·8 standard candles	
Value of gas in sperm	641·5 lb.	
Sulphur in gas after passing through lime purifier, per 100 cubic feet	23·80 grains	

Analyst—Thomas Fairley, F.R.S.E., F.I.C.

Date of Analysis—June 2, 1904.

STAFFORD COAL AND IRON COMPANY LIMITED,

Stoke-on-Trent.

Colliery— . . . . . Seam . . . . . Pit.

Shipping Port— . . . . . .

Rail— . . . . . Station.

Canal— . . . . . .

Great Row Coal.

Class of Coal— . . . . . .

Carbon	71·238 per cent.
Hydrogen	4·977 ,,
Oxygen	11·369 ,,
Nitrogen	1·188

STAFFORDSHIRE.

Notes.

Sulphur	1·428	per cent.
Ash	4·100	,,
Moisture	5·700	,,
Coke	59·200	,,
Volatile matter	40·800	,,
Gas, tar, &c.	34·518	,,
Fixed carbon	54·254	,,
Specific gravity	1·317	,,
Weight of 1 cubic foot	82·312	lb.
Heating power (practical)	8·123	
Heating power (theoretical)	13·010	
Calorific power	12568·100	B.T.U.

Analyst— . . . . . .

Date of Analysis— . . . . . .

Ash Coal.

Carbon	70·040	per cent.
Hydrogen	5·040	,,
Oxygen	12·022	,,
Nitrogen	1·323	,,
Sulphur	0·485	,,
Ash	5·600	,,
Moisture	5·490	,,
Coke	64·867	,,
Volatile matter	35·133	,,
Gas, tar, &c.	29·473	,,
Fixed carbon	58·952	,,
Specific gravity	1·297	
Weight of 1 cubic foot	81·062	lb.
Heating power (prac.)	8·577	
Heating power (theo.)	12·818	
Calorific power (B.T.U.)	12,382·05	B.T.U.

Analyst— . . . . . .

Date of Analysis— . . . . . .

Notes.

STAFFORDSHIRE.

TALK-O'-TH'-HILL COLLIERY LIMITED,

Talke, near Stoke-on-Trent.

Colliery—TALK-O'-TH'-HILL, Eight-feet Cockshead Seam, No. 2 Pit.

Shipping Ports—Garston, Liverpool, Runcorn, Widnes, Birkenhead, and ports on Manchester Ship Canal.

Rail—North Stafford, Talk-o'-th'-Hill, *via* Chatterley, Station.

Canal— . . . . . .

Steam Coal.

Class of Coal—Steam.

Chemical analysis :—	Per cent.
Water expelled at 212 degs. Fahr.	1·9
Volatile hydrocarbons	31·3
Fixed carbon	64·3
Ash	1·5
Sulphur	1·0
	100·0

Practical results—	Per cent.
Percentage of coke in coal ..	65·8
Coke per ton of coal	1,473
Colour of ash	Brown.

Calorific power—	
Total units of heat 8·001	14,402 B.T.U.
Pounds of water at boiling point converted into steam per pound of coal	14·9 lbs.

Very pure coal, low in moisture, ash and sulphur.

Analyst—Wm. Jas. Orsman.

Date of Analysis—February 22, 1905.

Colliery—TALK-O'-TH'-HILL, Banbury Seam, No. 2 Pit.

Gas Coal.

Class of Coal—Gas.

	Per cent.
Specific gravity	1·262
Weight of 1 cubic foot	78·89 lbs.
Space occupied by 1 ton	28·39 cubic feet

Proximate analysis—	Per cent.
Moisture	1·67
Volatile products	35·51
Fixed carbon ..	60·21
Sulphur	1·25
Ash (colour red)	1·36

STAFFORDSHIRE.

Notes.

Commercial analysis—

Gas per ton of coal	11,595 cubic feet
Gas per cubic foot of coal	408 cubic feet
Illuminating power in standard sperm candles	17·99 candles
Value of 1 cubic foot of the gas in sperm ..	432 grains
Sperm value per ton of coal	715 lbs.
Coke per ton of coal (good hard grey) ..	12·23 cwts.
Coke per cent. of coal	61·13 per cent.
Ash in the coke (colour red)	2·22 per cent.
Sulphur eliminated with the volatile products	11·68 lbs.
Sulphur in the coke	16·30 lbs.
Tar per ton of coal	14·24 gallons
Ammonia liquor per ton of coal	25·90 gallons

Analyst—R. O. Paterson.

Date of Analysis—June 7, 1905.

Notes.

WARWICK.

ARLEY COLLIERY COMPANY LIMITED,

Arley, Coventry.

(Offices: Hall End, Tamworth).

Colliery—ARLEY, Two-yard or Ryder, and "Slate Coal" Seams, Nos. 1 and 2 Pits.

Shipping Port—Lynn.

Rail—Midland, Arley and Fillongley Stations.

Canal—*Nil.*

Two-Yard Coal.

Class of Coal—Household.

	Dried at 212 degs. Fahr. Per cent.	As received. Per cent.
Fixed carbon	60·01	52·70
Volatile hydrocarbons	36·84	32·36
Sulphur	0·85	0·75
Ash	2·30	2·02
Moisture	—	12·17
	100·00	100·00
Sulphur in ash	0·19	0·17
Calorific power by Thompson's calorimeter	13·09 lb.	11·50 lb.
Calorific power, expressed in calories degs. Cent.	7,029	6,175 cal.

Analysts—Pattinson and Stead

Date of Analysis—June 16, 1905.

Two-Yard Spire.

Class of Coal—Steam Coal, Hard, High-class (Locomotive, etc.)

	Dried at 212 degs. Fahr. Per cent.	As received. Per cent.
Fixed carbon	63·50	56·39
Volatile hydrocarbons	33·92	30·12
Sulphur	0·68	0·60
Ash	1·90	1·69
Moisture	—	11·20
	100·00	100·00

WARWICK.

Notes.

Sulphur in ash	0·13	0·12
Calorific power by Thompson's calorimeter	13·36 lb.	11·86 lb.
Calorific power expressed in calories degs. Cent.	7,174	6,369 cal.

Analysts—Pattinson and Stead.

Date of Analysis—June 16, 1905.

Slate Coal.

Class of Coal—Household and Manufacturing.

	Dried at 212 degs. Fahr. Per cent.	As received. Per cent.
Fixed carbon	57·15	51·11
Volatile hydrocarbons	38·51	34·45
Sulphur	1·07	0·96
Ash	3·27	2·93
Moisture	—	10·55
	100·00	100·00
Sulphur in ash	0·29	0·26
Calorific power by Thompson's calorimeter	13·53 lb.	12·10 lb.
Calorific power expressed in calories degs. Cent.	7,266	6,498 cal.

Analysts—Pattinson and Stead.

Date of Analysis—June 16, 1905.

Slate Coal Spire.

Class of Coal—Steam, Hard.

	Dried at 212 degs. Fahr. Per cent.	As received. Per cent.
Fixed carbon	52·23	47·78
Volatile hydrocarbons	40·70	37·23
Sulphur	1·10	1·01
Ash	5·97	5·46
Moisture	—	8·52
	100·00	100·00
Sulphur in ash	0·05	0·05
Calorific power by Thompson's calorimeter	13·31 lb.	12·18 lb.
Calorific power expressed in calories degs. Cent.	7,147	6,541

Analysts—Pattinson and Stead.

Date of Analysis—June 16, 1905.

Notes.

WARWICK.

GRIFF COLLIERY COMPANY,

Nuneaton.

Colliery—GRIFF, Slate-Coal, Two-yard, and Seven-feet Seam, ... Pit.

Shipping Port— . . . . . .

Rail—L. and N. W. and Midland, Nuneaton Station.

Canal—Coventry.

Griff Steam Coal.

Class of Coal—Hand-picked Steam.

	Per cent.	
Fixed carbon	49·65	
Volatile matter	38·25	
Ash	2·15	
Moisture	9·95	
	100·0	
Sulphur	0·33	per cent.
Calorific value in British thermal units	11·913	B.T.U.
Evaporative power	12·32	lb.

Analyst—Bostock Hill.

Date of Analysis—July, 1905.

NEWDIGATE COLLIERY LIMITED,

Bedworth, Nuneaton.

Colliery—NEWDIGATE, Two Yard Seam, ... Pit.

Shipping Port— . . . . . .

Rail—L. and N. W. and Midland, Bedworth Station.

Canal—Coventry.

Two Yard Coal.

Class of Coal—House.

Moisture	8·5	per cent.
Sample dried at 212 degs. Fahr.—		
Volatiles	37·93	per cent.
Fixed carbon	59·83	per cent.
Ash	2·24	per cent.
	100·0	
Specific gravity	1·3	

Notes.

WARWICK.

Ultimate analysis—	Per cent.
Carbon	79·860
Hydrogen	5·340
Oxygen	10·528
Nitrogen	1·287
Sulphur	0·745
Ash	2·240
	100·00

Remarkably free from pyrites. Non-caking. Bituminous.

Analyst—Major Brunner.

Date of Analysis— . . . . . 1904.

Colliery—NEWDIGATE, Nine-foot Seam Pit.

Nine-foot Coal.

Class of Coal—Steam.

Chemical analysis—	Per cent.
Water expelled at 212 degs. Fahr.	7·1
Volatile hydrocarbons	37·6
Fixed carbon	50·6
Ash	3·9
Sulphur	0·8
	100·00

Percentage of coke in coal	54·5 per cent.
Coke per ton of coal	1,220 lb.
Colour of ash	Grey white
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	12,280 cubic feet
Illuminating power of gas in standard candles	16 candles
Character of the coke	Short and brittle
Calorific power—	
Total units of heat, *i.e.*, lbs. of water heated 1 deg. Fahr. by 1 lb. of coal	11,400 lb.

Experimental evaporative power of the coal, as determined by the calorimeter :—Pounds of water at boiling point converted into steam per 1 lb. of coal, 11·8 lb.

Analyst—J. W. Orsman.

Date of Analysis— . . . . . 1904.

Notes

YORKSHIRE.

BARNSLEY MAIN COLLIERY COMPANY LIMITED,

Barnsley.

Collieries—BARNSLEY MAIN AND OLD OAKS, ... Seam, ... Pit.

Shipping Ports—Hull, Grimsby, Goole, Keadby, Partington.

Rail—Great Central and Midland, Stairfoot Station.

Canal—South Yorks. Navigation.

Lidgett Gas Coal.

Class of Coal—Gas.

Gas per ton of coal	11,428	cubic feet
Gas per cubic foot of coal	411	cubic feet
Illuminating power in standard sperm candles	17·85	candles
Value of 1 cubic foot in sperm	427	grains
Sperm value per ton of coal	699	lb.
Coke per ton of coal	1,418	lb.
Coke per cent. of coal	63·3	per cent.
Ash in coke	3·73	per cent.
Sulphur eliminated with the volatile products	26·45	lb.
Sulphur in coke	24·30	lb.
Tar per ton of coal	18·29	gallons
Liquor	21·29	gallons

Analyst—R. O. Paterson.

Date of Analysis—February 20, 1901.

Ardsley Gas Coal.

Class of Coal—Gas.

Gas per ton of coal	11,428	cubic feet
Gas per cubic foot of coal	411	cubic feet
Illuminating power in standard sperm candles	19·59	candles
Value of 1 cubic foot in sperm	470	grains
Sperm value per ton of coal	767	lb.
Coke per ton of coal	1,462	lb.
Coke per cent. of coal	65·3	per cent.
Ash in coke	4·96	per cent.
Sulphur eliminated with the volatile products	13·54	lb.
Sulphur in coke	14·76	lb.
Tar per ton of coal	14·83	gallons
Liquor	31·50	gallons

Analyst—R. O. Paterson.

Date of Analysis—February 20, 1901.

YORKSHIRE.

Notes.

T. and R. W. BOWER LIMITED,

Woodlesford, near Leeds.

Colliery—ALLERTON MAIN, Middleton Main Seam, Albert Pit.
Shipping Ports—Hull, Goole.
Rail—North Eastern, Kippax Station.
Canal—Aire and Calder.

Silkstone Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal	11,200 cubic feet
Illuminating power	16 std. candles
Yield of coke per ton of coal	1,305 lb.
Ash in coke	6·3 per cent.
Specific gravity of coal	1·262
Value of 1 cubic foot in sperm	384 grains
Value of gas per ton of coal	614·3 lb. sperm
Sulphur	1·173 per cent.

Analyst—James Paterson, C.E., F.G.S.

Date of Analysis—April 13, 1880.

Allerton Main Cannel Coal.

Class of Coal— . . . . . .

Yield of gas per ton of coal	11,500 cubic feet
Illuminating power	19 std. candles
Coke per ton of coal	1,209 lb.
Ash in coke	7 per cent.
Value of 1 cubic foot in sperm	456 grains
Value of gas per ton of coal	749·14 lb. sperm

Analyst—James Paterson, C.E., F.G.S.

Date of Analysis—April 13, 1880.

Notes.

YORKSHIRE.

HENRY BRIGGS, SON AND CO. LIMITED,

Whitwood, Normanton.

Colliery—WHITWOOD, ... Seam, Don Pedro and Savile Pits.

Shipping Ports—Hull, Goole.

Rail— . . . . . Station.

Canal— . . . . . .

Stanley Main Steam Coal.

Class of Coal—Steam.

	Per cent.
Carbon	73·64
Hydrogen	4·80
Oxygen	9·09
Nitrogen	1·19
Sulphur	1·18
Ash	2·81
Water	7·29
	100·00
Coke	58·9
Volatile matter	41·1
	100·0

Calorific power: Water evaporated by 1 lb. of the coal, as determined by Thomson's calorimeter, 13 lb.

Analyst—John Pattinson.

Date of Analysis— . . . . . .

Colliery—WHITWOOD, ... Seam, Silkstone Pit.

Silkstone Gas Coal (Whitwood).

Class of Coal—Gas.

Yield of gas per ton of coal	11,000 cubic feet
Illuminating power	18·1 std. sperm candles
	Per cent.
Coke	59·5
Volatile matters	40·5
	100·0

The coal cokes well, and the resulting coke is of good quality.

Notes.

YORKSHIRE.

Complete ultimate analysis of the coal :—

	Per cent.
Carbon	75·65
Hydrogen	4·71
Oxygen	9·31
Nitrogen	1·86
Sulphur	1·94
Ash	2·50
Water	4·03
	100·0

The above results show that this is an excellent coal for gas-making purposes.

Analyst—John Pattinson.
Date of Analysis— . . . . . .

JOHN BROWN AND CO. LIMITED.

Atlas Works, Sheffield.

Collieries—ALDWARKE MAIN, CAR HOUSE, AND ROTHERHAM MAIN, Parkgate Gas Coal Seam, Parkgate Pit.

Shipping Ports—Hull, New Holland, Grimsby, Headby, Liverpool, Widnes, Garston, Partington, and other Manchester Ship Canal Ports.

Rail—Midland, Great Central, Rotherham Station.

Canal—(Aldwarke Main Colliery), Sheffield and South Yorkshire Navigation.

Aldwarke Main Gas Coal.

Class of Coal—Gas.

Specific gravity of coal (water as 1)	1,266
Weight of 1 cubic foot	78·884 lb.
Sulphur	0·300 per cent.
Purified gas per ton of coal	12,600 cubic feet
Matters condensable by bromine	2·25 per cent.
Illuminating power of gas consumed in a London standard Argand, at the rate of 5 cubic feet per hour, in sperm candles, of 120 grains	19·00 candles
Value of 1 cubic foot in sperm	456·200 grains
Weight of illuminating matter in sperm ..	820·80 lb.
Weight of coke per ton of coal	1·428 lb..

Notes.

YORKSHIRE.

Aldwarke Main Gas Coal—*cont.*

	Per cent.
Analysis of coke—	
Fixed carbon	96·10
Ash	3·90

Analyst—James Paterson.

Date of Analysis—May 9, 1879.

The above analysis was made as long ago as 1879, but with a view to confirming (or otherwise) those results further tests have been made of the entire seam of coal, and also of several sections of the seam. The first results have been improved upon, although as compared with 1879 the present workings are nearly two miles further distant from the shaft.

Entire Seam as Wrought in the Pit.

Specific gravity of coal (average)	1·267	lb.
Weight of 1 cubic foot	79·18	lb.
Sulphur in coal	0·37	per cent.
Average weight of sulphur per ton of coal ..	8·29	lb.
Purified gas per ton of coal	12,900	cubic feet
Gas per cubic foot of coal	465	cubic feet
Illuminating power of gas consumed in a London standard Argand	18·63	sperm candles
Value of 1 cubic foot in grains of sperm ..	447·15	grains
Weight of illuminating matter	822·60	lb. sperm
Weight of coke per ton of coal	1,414	lb.
Percentage of coke per ton of coal	63·12	per cent.
Coke analysis:—	Per cent.	
Fixed carbon	95·70	
Ash	4·30	

Analyst—James Paterson.

Date of Analysis—April 30, 1891.

Dull Hards (average of tests).

Specific gravity of coal (water as 1)	1·281	
Weight of 1 cubic foot	80	lb.
Sulphur	0·437	per cent.
Weight of sulphur per ton of coal	6·72	lb.
Purified gas per ton of coal	12,050	cubic feet
Gas, in cubic feet, per cubic foot of coal ..	430·36	cubic feet
Illuminating power	20·16	candles
Value of 1 cubic foot in sperm	443·44	grains
Weight of illuminating matter in sperm ..	832·21	lb.
Yield of coke per ton of coal, 1,420 lb. or ..	63·37	per cent.

Notes.

YORKSHIRE.

Analysis of coke—	Per cent.
Fixed carbon	95·70
Ash	4·30

Analyst—John Paterson.

Date of Analysis—May 9, 1879; April 30, 1891; March 23, 1893.

Bright Hards (average of tests).

Specific gravity of coal (water as 1)	1·291	
Weight of 1 cubic foot	80·68	lb.
Sulphur in coal	0·30	per cent.
Weight of sulphur per ton of coal	6·72	lb.
Purified gas per ton of coal	12,200	cubic feet
Gas per cubic foot of coal	439·47	cubic feet
Illuminating power of gas (consumed in a London standard Argand)	19·83	sperm candles
Value of 1 cubic foot in sperm	475·92	grains
Weight of illuminating matter in sperm ..	829·46	lb.
Weight of coke per ton of coal	1,400	lb.
Percentage of coke per ton of coal	62·50	per cent.

Analysis of coke—	Per cent.
Fixed carbon	96·70
Ash	3·30

Analyst—James Paterson.

Date of Analysis—May 9, 1879; April 30, 1891; March 21, 1893.

Bright Softs (average of tests).

Specific gravity of coal (water as 1)	1,267	
Weight of 1 cubic foot	79·29	lb.
Sulphur in the coal	0·38	per cent.
Weight of sulphur per ton of coal	8 51	lb.
Purified gas per ton of coal	11,750	cubic feet
Gas per cubic foot of coal	415·78	cubic feet
Illuminating power of gas	19·71	sperm candles
Value of 1 cubic foot in sperm	473·04	grains
Weight of illuminating matter in pounds sperm	794·03	lb.
Weight of coke per ton of coal	1,368	lb.
Yield of coke	60·71	per cent.

Coke analysis:—	Per cent.
Fixed carbon	95·20
Ash	4·80

Analyst—James Paterson.

Date of Analysis—May 9, 1879; April 30, 1891; March 21, 1893.

Notes.

YORKSHIRE.

J. and J. CHARLESWORTH LIMITED,

Wakefield.

Colliery—ROTHWELL HAIGH, ... Seam, Beeston Pit.
Shipping Ports—Hull, Goole.
Rail—Midland, E. and W. Yorkshire Union, Rothwell Station, Haigh Sidings.
Canal—Aire and Calder.

Beeston Nuts Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

	Per cent.	Lb. per ton of coal.
Moisture given off at 220 degs. Fahr...	4·33	97·00
Volatile matter (given off at red heat)	32·39	725·53
Coke	60·42	1,353·41
Ash	2·86	64·06
	100·00	2,240·00
Tar	4·19	94·00
Ammoniacal liquor (3 degs. Twaddell = 6 oz. liquor)	7·81	175·00
Containing real ammonia	0·10	2·28
Coke	61·66	1,380·00

Gas per ton of coal	11,750 cubic feet
Illuminating power of the gas per 5 cubic feet of gas	19 standard candles
Sulphur in gas after passing through lime, per 100 cubic feet	14·25 grains

Analyst—Thomas Fairley.
Date of Analysis—September 22, 1884.

YORKSHIRE.

Notes.

JAS. CRITCHLEY AND SONS LIMITED,

West End Collieries, Batley.

Colliery—WEST END, Batley.
Shipping Ports—Hull and Goole.
Rail—West End Sidings, Batley, L. and N. W.

West End Black Bed Coal.

Class of Coal—Gas.

Specific gravity	1·300	
Purified gas per ton	11,500	cubic feet
Value of 1 cubic foot in sperm	428·88	grains
Value of gas per ton of coal in sperm	704·59	lb.
Illuminating power of gas	17·87	std. candles
Coke per ton	1,437	lb.
Coke	64·15	per cent.
Fixed carbon in coke	92·5	per cent.
Ash in coke	7·5	per cent.
Sulphur in coal	2·77	per cent.

Analysts—Thos. Newbigging and Son.
Date of Analysis—September 14, 1903.

West End Beeston Gas Coal.

Class of Coal—Gas.

Specific gravity	1·290	
Purified gas per ton	11,150	cubic feet
Value of one cubic foot in sperm	476·16	grains
Value of gas per ton of coal in sperm	758·74	lb.
Illuminating power of gas	19·84	std. candles
Coke per ton	1,500	lb.
Coke	66·96	per cent.
Fixed carbon in coke	90	per cent.
Ash in coke	10	per cent.
Sulphur in coal	2·08	per cent.

Analysts—Thos. Newbigging and Son.
Date of Analysis—September 14, 1903.

Notes.

YORKSHIRE.

DALTON MAIN COLLIERIES LIMITED,

Parkgate, Rotherham.

Colliery— . . . . . Barnsley Seam, Silverwood and Roundwood Pits.

Shipping Ports—Hull, Goole, Grimsby, Keadby, Liverpool, Manchester Ship Canal, Boston.

Rail—Midland and Great Central Railways, Rawmarsh (Midland), Aldwarke (Great Central) Stations.

Canal—Sheffield and South Yorkshire Navigation.

Dalton Main Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

Hard steam coal—	Per cent.
Fixed carbon	62·95
Volatile hydrocarbons	35·28
Sulphur	0·63
Ash	2·46
Moisture	0·68
	100·00
Sulphur in ash	0·02
Calorific power expressed in calories (C.)	7,977

Equal to 14·85 lb. of water evaporated by 1 lb. of coal.

Best gas coal—	
Yield of gas per ton of coal..	11,760 cubic feet
Illuminating power of gas	16·10 std. sp. candles
Light given by gas from 1 ton of coal, when distilled, equal to	649·15 std. sp. candles
Yield of coke per ton of coal	12·66 cwt.
Ash in coke	2·12 per cent.

Analysts—Pattinson and Stead.

Date of Analysis—July 1904.

YORKSHIRE.

Notes.

DEARNE VALLEY COLLIERY COMPANY LIMITED,

Little Houghton, near Barnsley.

Colliery—DEARNE VALLEY, Shafton Seam, Dearne Valley Pit.
Shipping Ports—Keadby, Goole, Hull, Grimsby, Partington, &c.
Rail—Midland, Darfield Station.
Canal— . . . . . .

Dearne Valley Coal.

Class of Coal—Steam, Manufacturing, House.

	Per cent.
Ash	2·00
Sulphur	1·36
Volatile matter (including moisture expelled at 212 degs. Fahr., 8·44 per cent.)	45·45
Fixed carbon (by difference)	51·19
	100·00

Pounds of water evaporated from 212 degs. Fahr. by 1 lb. of the coal (determined by Lewis Thomson's calorimeter)	13·86 lb.
Equals British thermal units ..	13,397 B.T.U

Analyst—Wm. McD. Mackey.
Date of Analysis—May 25, 1904.

DENABY AND CADEBY MAIN COLLIERIES LIMITED,

Doncaster.

Colliery—DENABY AND CADEBY MAIN, Barnsley Thick Seam, Denaby and Cadeby Pits.
Shipping Ports—Liverpool, Manchester Ship Canal, Hull, Grimsby, Goole, etc.
Rail—Great Central, Lancs. and Yorks., and Hull and Barnsley, Conisbro' Station.
Canal—South Yorkshire Navigation.

Denaby and Cadeby Main Washed Singles.

Class of Coal—Steam, Manufacturing.

This coal was tested in practical use during 1903 and 1904 by an important manufacturing firm in London, when the following results were obtained.

Notes.

YORKSHIRE.

Denaby and Cadeby Main Washed Singles—*cont.*

Ten well-known South Wales coals showed an average evaporative power of 9·34 lb. of water per pound of coal used.

Denaby and Cadeby Main washed singles showed an evaporative power of 9·50 lb. of water per pound of coal used.

The saving in favour of the Denaby and Cadeby Main washed singles being £593 per annum.

Analyst— . . . . . .

Date of Analysis— . . . .

Washed Small Coal.

Class of Coal—Steam, Manufacturing.

	Per cent.
Ash	2·18
Sulphur	0·86
Volatile carbonaceous matter ..	36·09
Fixed carbon	56·69
Total combustible matter ..	92·78

The calorific value was determined in pounds of water evaporated from 212 degs. Fahr. by 1 lb. of the slack, and found to be 14·10 lb. This is a very good slack, both as regards lowness in ash and calorific value.

Analysts—Hunt and Mackey.

Date of Analysis—January 15, 1891.

In the sixty samples of Denaby and Cadeby washed coal submitted to me during the past four years, I find the average percentage of ash to be 2·26.

Analyst—Wm. McD. Mackey.

Date of Analysis—March 27, 1896.

YORKSHIRE.

Notes.

Denaby and Cadeby Main Washed Small Coal.

Class of Coal—Steam, Manufacturing.

This sample was black and bright; burnt freely with much flame. Ash, brown. Specific gravity, 1·290. One cubic foot weighs 80·4 lb.

Sample dried at 100 degs. Cent.

	Per cent.
Carbon	80·11
Hydrogen	5·13
Oxygen and nitrogen	11·76
Sulphur	0·79
Ash	2·21
	100·00
Coke	63·7
Calorific value (Thompson's Calorimeter)	14·3 per cent.

This is a very good clean coal, contains very small amount of ash, and is high in carbon and calorific value.

I may add that I have determined the ash in 27 samples of this washed coal during the last 12 months, and the average ash is 2·204 per cent., the figures varying very little during this period. I consider this an excellent coal for engine purposes or gas making.

Analyst—C. K. Baker, A.R.S.M., F.I.C.

Date of Analysis—June 1, 1893.

I find I have determined the ash in 189 samples of Denaby and Cadeby washed singles coal from 1892 to the present date, and the average ash of these samples is 2·716 per cent.

Analyst—C. K. Baker.

Date of Analysis—September 30, 1904.

Denaby and Cadeby Main Washed Gas Coal.

Class of Coal—Gas.

Treated in gas-making plant—

Illuminating gas per ton of coal	10,640 cubic feet
Illuminating power of gas	17·2 std. candles
Value in sperm	627·4 lb.
Coke	63·28 per cent.
Total gas capable of being given off in Siemens type of gas-producer	131,643 cubic feet

This is an excellent coal for use in Siemens type of gas-producer, and

Notes.

YORKSHIRE.

Denaby and Cadeby Main Washed Gas Coal—*cont.*

for metallurgical purposes generally. The sulphur and ash are very low, and the heating power is great.

It is also quite suitable for manufacture of illuminating gas.

Analyst—C. K. Baker, A.R.S.M., F.I.C.
Date of Analysis—July 27, 1901.

Denaby and Cadeby Double-screened Gas Nuts.

Class of Coal—Gas, House.

	Per cent.
Moisture	3·63
Coke	61·40
Ash	2·15
Sulphur	0·74
Yield of gas per ton of coal, when treated in small gas-making plant	10,080 cubic feet
Illuminating power of gas when burnt at 5 cubic feet per hour in London standard Argand burner	16·8 standard candles
Total gas capable of being driven off in Siemens type of gas producer, per ton ..	129,440 cubic feet

The sample was clean and perfectly free from smudge. Specific gravity, 1·269. The analysis shows it to be a very good coal for gas-making, and very suitable for burning in Siemens producer furnaces, on account of its small amount of ash and sulphur.

Analyst—C. K. Baker, A.R.S.M., F.I.C.
Date of Analysis—December 19, 1892.

Denaby and Cadeby Main Washed Steam Coal for Steamers' Use.

Class of Coal—Steam.

	Per cent.
Specific gravity	1·281
Fixed carbon	60·45
Volatile matter	33·46
Ash..	2·83
Moisture	3·26
	100·00
Sulphur	0·78

Calorific value (in pounds of water at 100 degs. Cent. which 1 lb. of coal will evaporate) by Thompson's calorimeter 14·6, equals 7,840 calories.

Analyst—C. K. Baker, A.R.S.M., F.I.C.
Date of Analysis—July 27, 1901.

YORKSHIRE.

Notes.

Best South Yorkshire Hard Steam Coal.

Class of Coal—Steam.

Sample taken from bulk of cargo at Oxelosund.

	Per cent.
Volatile carbonaceous matter ..	32·85
Fixed carbon (ash free)	64·56
Ash	2·59
	100·00
Sulphur	0·90 per cent.

Calorific heating power, 8,120 calories.

Analyst—Kemiskt Tekniska Bryän, per John Landin.

Date of Analysis—Stockholm, January 27, 1900.

Denaby and Cadeby Main Hard Steam Coal.

Class of Coal—Steam.

	Per cent.
Coke	62·83
Volatile matter	37·17
Ash	3·64
Ultimate analysis:—	
Carbon	77·39
Hydrogen	4·81
Oxygen	9·14
Nitrogen	1·59
Sulphur	0·59
Ash	3·64
Moisture	2·84

The coal is bituminous; the coke is hard and dense, and has a metallic ring; the ash is light grey.

Calorific power of coal	14,314 B.T.U.
Evaporative power of coal	14·80 lb.

Analyst— . . . . . .

Date of Analysis—December 16, 1904.

Notes.

YORKSHIRE.

Denaby and Cadeby Main Hard Steam Coal.

Class of Coal— . . . . . .

Our chemist has finished the analysis of your sample of hard coal. He says it is a very good coal, and does not remember having had a better for analysis. I give you below details :—

	Per cent.
Carbon	77·05
Sulphur	0·60 (very low)
Ash	3·70
Moisture	3·17
Evaporative power	13·17 lb.
Calorific power (determined by Thompson's calorimeter)	13335·0 cal.

Analyst— . . . . . .

Date of Analysis—December 8, 1904.

Extract from report on coal selected and analysed by Professor Hy. Louis of Durham, for the Swedish Iron Masters, 5th July, 1899.

Denaby Main Hards.

Class of Coal—Steam.

Complete analysis on dried substance—

	Per cent.	Per cent.
Moisture	2·1	2·9
Carbon	81·6	81·2
Hydrogen	5·4	5·2
Nitrogen	1·47	1·58
Oxygen	5·92	6·29
Sulphur	1·61	1·63
Ash	4·0	4·1
	100·00	100·00
Caloric value in bomb calories ..	8,210	8,190

Estimating analysis—

	Per cent.	Per cent.
Coke	64·5	64·9
Volatile matter	29·4	28·1
Moisture	2·1	2·9
Ash	4·0	4·1

Remarks about the quality of coke. The appearance of the ash, &c. :—Flame, long ; coke, firm ; ash, grey, yellow.

Analyst—Professor H. Louis.

Date of Analysis—July 5, 1899.

YORKSHIRE.

Notes.

Mr. HENRY ELLISON,

Cleckheaton.

Colliery—WHITEHALL, Low Bed Seam, ... Pit.
Shipping Ports—Goole, Manchester.
Rail—Lancs. and Yorks, Wyke and Cleckheaton Stations.
Canal— . . . . . .

Low Moor Cannel.

Class of Coal—Gas.

The coal contains :—	Per cent.	Lb. per ton.
Moisture (given off at 212 degs. Fahr.)	1·05	23·52
Volatile matter (at red heat)	41·15	921·76
Fixed matter (coke and ash)	57·80	1,294·72
	100·00	2,240·00
Containing ash	15·39	344·736
Total sulphur in coal	2·72	60·928

Analysed in a model gas apparatus, one-hundredth ton, or 22·4 lb. of coal give :—

	Per cent.	Lb. per ton.
Tar	14·92	334·37
Ammoniacal liquor, 1·82 degs. Twaddell, 3·64 oz. strength	5·44	121·87
Containing real ammonia	0·78	17·472
Coke	58·87	1,318·75
Cubic feet of gas per ton (bar. 30 in., temperature 60 degs. Fahr.)		11,285 cubic ft.
Illuminating power of gas in standard candles per 5 cubic feet of gas		25·9 standard candles
Giving value of gas in sperm		1,002·1 lb.
Sulphur in gas after passing through lime purifiers in grains per 100 cubic feet		20·03 grains

Analyst—Thomas Fairley.

Date of Analysis— . . . . . .

Notes.

YORKSHIRE.

THE RIGHT HON. EARL FITZWILLIAM,

Elsecar, near Barnsley.

Colliery—ELSECAR, Barnsley Seam, Elsecar and Low Stubbin Pits.
Shipping Ports—Hull, Grimsby, Goole, Liverpool, Manchester, etc.
Rail—Great Central, Midland, Elsecar, Rotherham Road, and Masboro' Stations.
Canal—South Yorkshire Navigation.

Elsecar Best Hard Steam Coal.

Class of Coal—Steam.

Analysis—	Per cent.
Carbon	79·40
Hydrogen	4·58
Oxygen and nitrogen	8·20
Ash	3·04
Water	4·22
Sulphur	0·56
	100·00

This is a hard steam coal of the best quality, the percentage of carbon is high, and the amount of ash left after combustion is unusually low. The coal also contains only a very small amount of sulphur.

Analyst—C. A. Bothamley, F.C.S.
Date of Analysis—June 1, 1884.

S. FOX AND COMPANY LIMITED,

Stockbridge, near Sheffield.

Colliery—STOCKBRIDGE, Halifax Seam, ... Pit.
Shipping Port—None.
Rail—Great Central, Deepcar Station.
Canal—None.

Halifax Soft Coal, Halifax Hard or Ganister Coal.

Class of Coal—Manufacturing.

Analysis—	Halifax Soft Coal. Per cent.	Halifax Hard or Ganister Coal. Per cent.
Fixed carbon	60·83	47·19
Volatile hydrocarbons	32·52	37·00
Sulphur	0·90	5·26
Ash	4·97	7·00
Water	0·78	3·55
	100·00	100·00

Analyst—R. Harris.
Date of Analysis—April 2, 1906.

YORKSHIRE.

Notes.

OWNERS OF GARFORTH COLLIERY,

Garforth, near Leeds.

Colliery—GARFORTH, Beeston Seam, Isabella and Sisters Pits.
Shipping Ports—Hull, Goole.
Rail—North Eastern, Garforth Station.
Canal—None.

Beeston Best Coal.

Class of Coal—Steam, Manufacturing, House.

	Per cent.	Lb. per ton.
Moisture	8·75	196·00
Volatile matter	34·37	769·89
Coke	55·95	1253·28
Ash	0·93	20·83
	100·00	2240·00
Total sulphur in coal	0·83	18·59

Analyst—Thomas Fairley.
Date of Analysis—April 28, 1885.

GLASS HOUGHTON AND CASTLEFORD COLLIERIES LIMITED,

Castleford.

Colliery—GLASS HOUGHTON, Silkstone Seam, No. 1 Pit.
Shipping Ports—Goole, Hull.
Rail—Lancs. and Yorks., North Eastern, Castleford Station.
Canal—None.

Silkstone Gas Coals.

Class of Coal—Gas.

	No. 4a Screened.	No. 8's 1¼ in. Gas Nuts.	⅓ No. 17's Large Screened Coal. ⅔ No. 10's Rough Slack.	½ No. 4's Large Unscreened. ½ No. 10's Rough Slack
Cubic feet of gas per ton of coal	10,500	10,300	10,000	10,200
Illuminating power as ascertained by burning the gas, rate at 5 cubic feet per hour, with No. 1 London Argand standard burner, sperm candle	17·4	17·1	17·7	17·6
Illuminating value per ton in pounds sperm	626	604	607	615

Notes.

YORKSHIRE.

Silkstone Gas Coals—*cont.*

	Per cent.	Per cent.	Per cent.	Per cent.
Percentage of coke and volatile matters:—				
Non-volatile matters (coke)	62	61·8	62·5	61·8
Volatile matters, including water, expelled at a red heat in a closed vessel	38	38·2	37·5	38·2
	100	100·0	100·0	100·0
Complete "ultimate" analyses of the coals were made and the following results were obtained:—				
Carbon	74·24	73·92	73·41	73·16
Hydrogen	4·83	4·86	4·86	4·80
Oxygen	7·08	8·03	7·41	7·41
Nitrogen	1·50	1·46	1·37	1·61
Sulphur	1·70	1·87	1·80	1·34
Ash	5·68	4·98	6·34	6·56
Water	4·97	4·88	4·81	5·12
	100·00	100·00	100·00	100·00
Burnt in Thompson's calorimeter—				
Pounds of water evaporated from 212 degs. Fahr. by 1 lb. of the coal	13·7	13·6	13·5	13·3

These are very good coals for gas-making purposes.

Analysts—J. and H. S. Pattinson.

Date of Analysis—May 27, 1904.

Colliery—GLASS HOUGHTON, Flockton Seam, No. 1 Pit.

(1) "Tops," (2) "Bottoms."

Class of Coal—Gas.

The coals were submitted to distillation in a coal-testing apparatus at a temperature of 1,000 degs. Cent., and the gas yielded was measured. This gas was burnt in a photometer fitted with the No. 1 London Argand standard burner, at such a rate as to give the maximum efficiency of illumination; the illuminating power was determined, and the proportionate illuminating power at the standard rate of consumption of 5 cubic feet per hour was calculated from the results:—

YORKSHIRE.

Notes.

	(1) Tops.	(2) Bottoms.
Yield of gas per ton of coal	10,500	10,500 cub. ft.
Illuminating power of the gas	16·4	15·7 std. candles
Illuminating value of gas expressed in sperm per ton of coal	590	565 lb.

The coals yielded the following percentage amounts of coke and volatile matters :—

	Tops. Per cent.	Bottoms. Per cent.
Non-volatile matters (coke)	60·8	60·8
Volatile matters, including water, expelled at 1,000 degs. Cent. in a closed vessel	39·2	39·2
	100·0	100·0

A complete "ultimate" analysis was made of each coal, and the following results were obtained :—

	Tops. Per cent.	Bottoms. Per cent.
Carbon	73·36	71·62
Hydrogen	4·80	4·57
Oxygen	8·36	7·21
Nitrogen	1·34	1·24
Sulphur	1·37	2·81
Ash	5·60	6·64
Water	5·17	5·91
	100·00	100·00

The calorific powers of the samples were also determined, and the following results were obtained :—

	Tops.	Bottoms.
Pounds of water evaporated from 212 degs. Fahr. by 1 lb. of the coal	13·4	13·1

These are both gas coals of good quality.

Analysts—J. and H. S. Pattinson.

Date of Analysis—November 14, 1905.

Notes.

YORKSHIRE.

Colliery—GLASS HOUGHTON, Blocking Coal Seam, No. 1 Pit.

"Blocking" Coal.

Class of Coal—Gas.

On submitting the coal to distillation in a coal-testing apparatus, 10,500 cubic feet of gas were obtained per ton of coal, having an illuminating power equal to 15·8 standard sperm candles as ascertained by burning the gas at the rate of 5 cubic feet per hour in a photometer fitted with the No. 1 London Argand standard burner. The illuminating value of the coal per ton expressed in pounds of sperm is 569.

The coal yielded the following percentage amounts of coke and volatile matters:—

	Per cent.
Non-volatile matters	62·5
Volatile matters, including water expelled at a red heat in a closed vessel	37·5
	100·0

A complete ultimate analysis of the coal was made and the following results were obtained:—

	Per cent.
Carbon	70·69
Hydrogen	4·65
Oxygen	5·55
Nitrogen	1·24
Sulphur	4·70
Ash	8·64
Water	4·53
	100·00

The calorific power of the coal was also determined by Thompson's calorimeter, and the following results were obtained:—

Pounds of water evaporated from 212 degs. Fahr. by 1 lb. of the coal .. .. 13·4 lb.

Analysts—J. and H. S. Pattinson.

Date of Analysis—August 30, 1904.

YORKSHIRE.

Notes.

Mr. JOSEPH HAIGH,

Bruntcliffe, near Leeds.

Colliery—VICTORIA, Beeston Seam, Bruntcliffe Pit.
Shipping Ports—Hull, Goole.
Rail—Great Northern, Morley Station.
Canal—None.

Bruntcliffe Beeston Gas Coal.

Class of Coal—Gas.

Specific gravity of the coal	1·267	
Purified gas per ton	11,800	cubic feet
Illuminating power	21·34	std. candles
Value of 1 cubic foot	512·16	grains sperm
Illuminating matter per ton	863·35	lb. sperm
Coke per ton	1,375	lb.
Coke	61·38	per cent.
Ash in coke	8·05	per cent.
Fixed carbon in coke	91·95	per cent.
Sulphur in coal	0·89	per cent.
Tar per ton of coal	10	gallons
Ammoniacal liquor per ton of coal	19	gallons

Analysts—Thomas Newbigging and Son.
Date of Analysis—April 17, 1896.

Colliery—VICTORIA, Black Bed Seam, Bruntcliffe Pit.

Bruntcliffe Black Bed Gas Coal.

Class of Coal—Gas.

Specific gravity of the coal	1,314	
Purified gas per ton	11,350	cubic feet
Illuminating power	18·36	std. candles
Illuminating matter per ton	714·46	lb. sperm
Coke per ton	1,409	lb.
Coke	62·90	per cent.
Ash in coke	3·48	per cent.
Fixed carbon in coke	96·52	per cent.
Sulphur in coal	1·46	per cent.
Tar per ton of coal	9·46	gallons
Ammoniacal liquor per ton of coal	19·25	gallons

Analysts—Thomas Newbigging and Son.
Date of Analysis—June 22, 1895.

Notes.

YORKSHIRE.

HOYLAND SILKSTONE COAL AND COKE COMPANY LIMITED,

Hoyland, near Barnsley.

Colliery—HOYLAND SILKSTONE, ... Seam, ... Pit.

Shipping Ports—Keadby, Goole, Hull, Grimsby, Partington, Liverpool.

Rail— { Midland, Elsecar and Hoyland Stations. Great Central, Birdwell Station.

Canal—South Yorkshire (Elsecar Branch).

Hoyland Silkstone Gas Coal.

Class of Coal—Gas.

Specific gravity	1·287
Purified gas per ton	11·950 cubic feet
Illuminating power	17·72 standard candles
Illuminating matter in sperm per ton	726·01 lb.
Coke per ton	1,500 lb.
Coke	66·96 per cent.
Fixed carbon in coke	94 per cent.
Ash in coke	6 per cent.
Sulphur in coal	1·068 per cent.

Analyst—Thomas Newbigging.

Date of Analysis—April 21, 1892.

Hoyland Silkstone Gas Coal.

Class of Coal—Gas.

Specific gravity of coal (water as 1)	1·27
Weight of 1 cubic foot	79·375 lb.
Sulphur in coal	0·79 per cent.
Purified gas per ton of coal	11,525 cubic feet
Gas per cubic foot of coal	407·5 cubic feet
Illuminating power of gas consumed in London standard Argand	18·79 sperm candles
Value of 1 cubic foot	450·96 grains sperm
Weight of illuminating matter	742·47 lb. sperm
Weight of coke per ton of coal	1,477 lb.
Percentage of coke in coal	65·937 per cent.
Fixed carbon in coke	95·75 per cent.
Ash in coke	4·25 per cent.
Weight of sulphur per ton of coal	19·936 lb.

Calorific value of coal equal to the evaporation of 14·63 lb. water from 212 degs. by the combustion of 1 lb. of coal.

Analyst—James Paterson.

Date of Analysis—April 11, 1893.

YORKSHIRE.

Notes.

Silkstone Gas Nuts.

Class of Coal—Gas.

Specific gravity	1·256	
Purified gas per ton	11,550	cubic feet
Illuminating power	18·09	std. candles
Illuminating matter in sperm per ton	716·36	lb.
Coke per ton	1,484	lb.
Coke	66·25	per cent.
Fixed carbon in coke	95·50	per cent.
Ash in coke	4·50	per cent.
Sulphur in coal	0·521	per cent.

Analyst—Thomas Newbigging.

Date of Analysis—April 21, 1892.

New Silkstone Gas Coal.

Class of Coal—Gas.

Specific gravity	1 270	
Purified gas per ton	11,850	cubic feet
Illuminating power	18·36	std. candles
Illuminating matter in sperm per ton	745·94	lb.
Coke per ton	1,453	lb.
Coke	64·86	per cent.
Fixed carbon in coke	95·45	per cent.
Ash in coke	4·55	per cent.
Sulphur in coal	1·1	per cent.

Analyst—Thomas Newbigging.

Date of Analysis—April 21, 1892.

Notes.

YORKSHIRE.

EXECUTORS OF E. LISTER KAYE,

Denby Grange Collieries, near Wakefield.

Colliery—DENBY GRANGE, ... Seam,
. . . . . Pit.
Shipping Port— . . . . . .
Rail— . . . . . Station.
Canal— . . . . . .

Flockton "New Hards" Gas Coal.

Class of Coal—Gas.

	Per cent.	Lb. per ton.
Moisture (given off at 212 degs. Fahr.)	0·64	14·336
Volatile matter (at red heat)	36·14	809·536
Fixed matter (coke and ash)	63·22	1,416·128
	100·00	2,240·000
Containing ash	1·57	35·168
Total sulphur in coal	0·59	13·216

Analysed in a model gas apparatus, $\frac{1}{100}$ ton, or 22·4 lb. of coal give :—

	Per cent.	Lb. per ton.	
Tar	6·83	153·12	
Ammoniacal liquor, 1·92 Twaddell, 3·84 oz. strength	3·76	84·37	
Containing real ammonia	0·83	18·59	
Coke	63·99	1,437·50	
Cubic feet of gas per ton (bar. 30 in., temperature 60 degs. Fahr.)..		11,746·6	cubic feet
Illuminating power per 5 cubic feet of gas		19·4	std. candles
Giving value of gas in sperm		781·3	lb.
Sulphur in gas after passing through lime purifiers, in grains per 100 cubic feet		15·54	grains

Analyst—Thomas Fairley.

Date of Analysis—June 25, 1894.

WORKING ANALYSIS.

Average of tests made from bulk in the usual manner of working. The coal is of first-class quality for the purposes of gas manufacture, and shows a large yield of gas per ton (of high illuminating power), also of residual products. The coke produced therefrom is of excellent quality and suitable for all commercial and gasworks firing purposes.

YORKSHIRE.

Notes.

Commercial analysis (average of tests—		
Specific gravity of coal (water as 1) ..	1·268	
Weight of 1 cubic foot	79·25	lb.
Purified gas per ton of coal..	11,034	cubic feet
Purified gas per cubic foot of coal.. ..	390·37	cubic feet
Illuminating power, ascertained by a certified Letheby-Bunsen photometer, bearing the Board of Trade stamp, 1898, Methven screen, and standard pentane tests	18·44	candles
Value of gas from 1 ton of coal, in sperm	697·6	lb.
Value of gas in sperm per cubic foot of gas	442·56	grains
Weight of coke per ton of coal	1,491	lb.
Percentage of coke in coal	66·56	per cent.
Tar per ton of coal, obtained to outlet of condensers	11·6	gallons
Ammoniacal liquor, obtained to outlet of condensers	22·7	gallons
Strength of ammoniacal liquor	4⅜	degs. Twaddell
Strength of ammoniacal liquor (oz. strength)	8¾	oz.

Analyst—Matt. Dunn, M.I.Mech.E.

Date of Analysis—August 24, 1901.

Wheatley Gas Coal.

Class of Coal—Gas.

Purified gas, per ton	10,600 cubic feet
Illuminating power	17·72 candles
Coke (hot)	10 cwt. 2 qrs. 24 lb.
Tar	15 gallons
Liquor (5 degs. Twaddell)	26 gallons
Quality of coke	Large, good and clean

Analyst—S. Meunier.

Date of Analysis—February 22, 1904.

Notes.

YORKSHIRE.

LOFTHOUSE COLLIERY COMPANY,

Lofthouse Colliery, near Wakefield.

Colliery—LOFTHOUSE, Silkstone Seam, Lofthouse Pit.
Shipping Ports—Goole, Hull.
Rail—Great Northern, Lofthouse Station.
Canal—Aire and Calder Navigation.

Silkstone Gas Coal.

Class of Coal—Gas.

The coal contains:—	Per cent.	Lb. per ton.
Moisture (given off at 212 degs. Fahr.)	1·88	42·112
Volatile matter (at red heat)	33·45	749·280
Fixed matter (coke and ash)	64·67	1,448·608
	100·00	2,240·000
Containing ash	7·75	173·600
Total sulphur in coal	3·50	78·400

Analysed in a model gas apparatus, one-hundredth ton, or 22·4 lb. of coal, give:—

	Per cent.	Lb. per ton.
Tar	10·71	262·500
Ammoniacal liquor (2·5 degs. Twaddell, 5 oz. strength)	9·71	218·750
Containing real ammonia	1·08	24·192
Cubic feet of gas per ton (bar. 30 in., temperature 60 degs. Fahr.)	10,950 cubic feet	
Illuminating power of gas in standard candles per 5 cubic feet of gas in 24-hole burner	18·4 candles	
Giving value in sperm	690·7 lb.	
Coke per cent.	63·88	1,431·250 lb
Containing combustible matter	83·40	In 100 parts of coke.
Containing ash	14·75	
Containing (total sulphur 2·89 per cent.)		

Analyst—Thomas Fairley.

Date of Analysis—March 21, 1903.

Notes.

YORKSHIRE.

Colliery—LOFTHOUSE, Silkstone Little Coal Seam, Lofthouse Pit.

Little Coal.

Class of Coal—Steam.

The coal contains :—	Per cent.	Lb. per ton.
Moisture (given off at 212 degs. Fahr.)	2·60	58·240
Volatile matter (at red heat)	33·68	754·432
Fixed matter (coke and ash)	63·72	1,427·328
	100·00	2,240·000
Containing ash	4·60	103·040
Total sulphur in coal	1·33	29·792

Analysed in a model gas apparatus, one-hundredth ton, or 22·4 lb. of coal, give :—

	Per cent.	Lb. per ton.
Tar	7·53	168·750
Ammoniacal liquor (2 degs. Twaddell, 4 oz. strength)	6·41	143·750
Containing real ammonia	0·86	19·264
Cubic feet of gas per ton (bar. 30 in., temp. 60 degs. Fahr.)	11,000 cubic feet	
Illuminating power of gas in standard candles per 5 cubic feet of gas in 24-hole burner	18·4 candles.	
Giving value in sperm	—	693·9 lb.
Coke	64·45	1,443·750 lb.
Containing combustible matter	87·70	In 100 parts of coke.
Containing ash	8·90	
Containing (total sulphur, 0·76 per cent.)		

Analyst—Thomas Fairley.
Date of Analysis—March 23, 1903.

LOW MOOR COAL COMPANY LIMITED,

Low Moor, Bradford.

Colliery—LOW MOOR, Better Bed Seam, ... Pit.
Shipping Port—None.
Rail—Lancashire and Yorkshire, Low Moor Station.
Canal—Calder and Hebble.

Better Bed Coal.

Class of Coal—Manufacturing.

	Per cent.
Ash	7·00
Sulphur	0·51
Volatile matter	30·43
Moisture	2·11
Fixed carbon (by difference)	59·95

Analyst—Wm. McD. Mackey.
Date of Analysis—June 19, 1902.

Notes.

YORKSHIRE.

Colliery—LOW MOOR, Black Bed Seam, ... Pit.

Black Bed Coal.

Class of Coal—Gas, Steam.

	Per cent.
Ash	1·44
Sulphur	1·20
Volatile matter (includes water 1·92 per cent.)	34·28
Fixed carbon (by difference) ..	63·08
	100·00

Pounds of water evaporated from 212 degs. F. by 1 lb. of the coal (determined in Lewis Thomson's calorimeter)	14·79 lb.
Equal to a calorific value of coal in Centigrade heat units (being pounds of water capable of being heated 0 to 1 deg. Cent. by 1 lb. of coal)	7,942

The following analysis of the same coal (Black Bed) proves its adaptability for gasmaking purposes :—

Specific gravity	1·277
Weight of 1 cubic foot	79·68
Purified gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	11,483 cubic feet
Illuminating power of gas (by No. 1 London Argand 24-hole burner)	17·0 std. candles
Value of gas, per ton of coal, in sperm.. ..	669·3 lb.
Yield of coke per ton of coal	12·99 cwt.
Equal to a percentage yield of coke of.. ..	64·96 per cent.
Ammoniacal liquor per ton of coal	3·41 lb.
Equal to a yield of sulphate of ammonia per ton of coal	13·27 lb.
Ash in coke..	2·21 per cent.

The resulting coke was of good quality.

Analyst—Wm. McD. Mackey.

Date of Analysis—June 19, 1902.

YORKSHIRE.

Notes.

THE MICKLEFIELD COAL AND LIME COMPANY LIMITED,

East Parade, Leeds.

Colliery—PECKFIELD, Beeston Thick Seam, ... Pit.
Shipping Ports—Hull, Goole, Heysham, Barrow-in-Furness.
Rail—North-Eastern, Micklefield Station.
Canal— . . . . .

Micklefield Steam Coal.

Class of Coal—Steam.

	Per cent.
Carbon	78·92
Hydrogen	5·07
Oxygen	9·84
Nitrogen	0·75
Sulphur	1·28
Ash	4·14
	100·00
Water lost by drying at 100 deg. Cent.	7·17

Calorific power determined in Thompson's calorimeter.
Pounds of water evaporated from 100 deg. Cent. by 1 lb. of the coal .. .. 14·1 lb.
Equal to 7·558 degs. Cent. heat units.

Micklefield Gas Coal.

Class of Coal—Gas.

10,500 cubic feet of gas of 17·58 candles.
Weight of illuminating matter, in sperm per ton, 627·9 lb.

Commercial analysis (average of tests):—

Specific gravity of coal (water as 1)	1·260
Weight of 1 cubic foot	78·43 lb.
Sulphur in coal	0·42 per cent.
Sulphur in coal per ton	9·35 lb.
Purified gas per ton of coal	10·444 cubic feet
Purified gas per cubic foot of coal	366·61 cubic feet
Illuminating power ascertained by a certified Letheby-Bunsen photometer, bearing Board of Trade stamp, 1895	17·40 candles
Value of gas from 1 ton of coal in sperm ..	623·01 lb.
Value of 1 cubic foot of gas in sperm	417·32 grains
Weight of coke per ton of coal	1,484 lb.

Notes.

YORKSHIRE.

Micklefield Gas Coal—*cont.*

Percentage of coke in coal	66·37 per cent.
Fixed carbon in coke	95·75 per cent.
Ash in coke..	4·25 per cent.
Tar per ton of coal	10·90 gallons
Weight of tar per ton of coal	125·5 lb.
Ammoniacal liquor per ton of coal ..	17·65 gallons
Strength of ammoniacal liquor	2·75 degs. Twadd.

Analyst—Matt. Dunn, A.M.I.Mech.E.

Date of Analysis—April 3, 1897.

MIRFIELD COAL COMPANY,

Ravensthorpe, Dewsbury.

Colliery—MIRFIELD, Black Bed Seam, Dark Lane, Calder, and Mirfield Moor Pits.

Shipping Ports—Goole, Hull, Liverpool, Manchester Ship Canal.

Rail—Lancashire and Yorkshire, L. and N.W., Northorpe, Mirfield, and Ravensthorpe Stations.

Canal—Calder and Hebble.

Mirfield Gas Coal.

Class of Coal—Gas.

Colour: bright black and shining; horizontal partings: rough and shining, with occasional slight deposits of shale; vertical partings: smooth, with very slight deposits of carbonate of lime; fracture: irregular; cross fracture: irregular, showing slight deposits of iron pyrites. It also contains a band of rich cannel, from 2½ to 3 inches thick, constituting about 10 per cent. of the whole. The cannel has a pitchy appearance, and fractures conchoidally. Soft and rather friable. On the fire it intumesces and agglomerates slightly. Colour of ash: dark grey; specific gravity: 1·326 (water=1); weight of 1 cubic foot 82·78 lb.

Chemical analysis—	Per cent.
Volatile matter (containing 1·92 per cent. of sulphur) .. .	29·53
Fixed combustible matter ..	66·32
Ash	3·55
Water expelled at 112 degs. Fahr.	0·60
	100·00

YORKSHIRE.

Notes.

Practical analysis :—

Purified gas per ton (bar. 30 in., ther. 60 degs.)	11,584 cubic feet
Illuminating power of gas (std. burner) ..	18·76 sperm candles
Value of illuminating matter per ton in sperm	745·10 lb.
Hydrocarbons in gas..	4·25 per cent.
Carbon oxide in gas	8·25 per cent.
Carbonic acid (foul gas)	2·00 per cent.
Sulphuretted hydrogen (foul gas)	2·00 per cent.
Tar produced per ton	91·66 lb.
Liquor produced per ton	143·75 lb.
Strength of ammoniacal liquor	5 degs. Twaddell
Quantity of coke produced	1,565·25 lb.
Ash in coke	5·03 per cent.

The above results are the mean of four tests at Halifax Corporation Gasworks, and show the coal to be of first-class quality for gas and heating purposes.

Analyst—Wm. Carr.

Date of Analysis—March 13, 1879.

Another analysis gave the following results :—The coal is clean and very free from foreign matters. Surfaces bright and shining, rather friable, and cubical in all directions. Streak : brownish black. On the fire it fuses and intumesces, leaving a light brown coloured ash. Its specific gravity is 1·252 (water as 1). The weight of 1 cubic foot is therefore 78·026 lb. One cwt. of lime purifies about 17,000 cubic feet of gas. It appears from the results to stand at the head of our gas coals.

Commercial analysis :—

Purified gas per ton of coal	12,600 cub. ft. (average)
Matters condensable by bromine	5·15 per cent.
Illuminating power of gas consumed in a London standard Argand, at the rate of 5 cubic feet per hour, in sperm candles of 120 grains each	16·67 candles
Value of 1 cubic foot in sperm	400·00 grains
Weight of illuminating matter per ton of coal in sperm	720·00 lb.
Weight of coke per ton of coal	143·00 lb.
Ash in coke	1·88 per cent.

Analyst—James Paterson.

Date of Analysis—May 3, 1877.

Notes.

YORKSHIRE.

Mirfield Gas Coal—*cont.*

Analysis—

Specific gravity	1·275
Purified gas per ton	12,300 cubic feet
Illuminating power of gas	20·84 standard sperm [candles
Illuminating matter in sperm per ton	878·85 lb.
Coke per ton	1,328 lb.
Coke	59·29 per cent.
Fixed carbon in coke	95 per cent.
Ash in coke	5 per cent.
Sulphur in coal	2·07 per cent.

Analysts—Thomas Newbigging and Son.

Date of Analysis—June 4, 1904.

The Manager, Yeovil Corporation Gas Department (Somersetshire) writes (July 18, 1904):—"I am glad to be able to write favourably of your coal for gasmaking purposes. I find that a make of 11,500 cubic feet per ton of 17 to 18 candle gas may be relied upon in regular every day working."

The Manager, Wilmslow and Alderley Edge Gas Company, near Manchester, writes (August 12, 1904):—"I have the pleasure of giving you the practical results of our working from July 31 to August 12, 1904, with Mirfield unscreened gas coal:—

Coal carbonised	268 tons 10 cwt.
Gas made	3,028,000 cubic feet
Average make per ton	11,277 cubic feet
Illuminating power	18·7 candles (average)
Coke (excellent)	13 cwt. 1 qr. 15 lb.
Tar (per ton)	10 gallons
Liquor 4½ Twaddell	9 gallons

The following results are reported from the Bury St. Edmunds Gasworks as obtained from an ordinary working of Mirfield coal:—

Yield of gas per ton	11,060 cubic feet
Illuminating power	18·51 std. candles
Quantity of coke	13 cwt. 3 qrs.

In the use of Mirfield coal at the Stratford-on-Avon Gasworks an average working yielded 10,875 cubic feet of 18·23 candle gas, and 14 cwt. 3 qrs. of coke per ton of coal carbonised.

"I have used the Mirfield coal this winter almost exclusively in Petersfield, Emsworth, Cosham and Litchfield Gasworks. I find it a very good coal, yielding a large quantity of gas and an excellent coke;

Notes.

care must, however, be taken to have good heats and not to charge heavily. In small gasworks, where charging is done by the shovel, the stoker should be careful to have his charges thinly and evenly spread over the floor of the retort."—J. Douglas, late president British Association of Gas Managers.

MITCHELL MAIN COLLIERY COMPANY LIMITED,

25, Regent Street, Barnsley.

Colliery—MITCHELL MAIN (Wombwell), ... Seam, ... Pit.

Shipping Ports—Goole, Grimsby, Hull, Liverpool, Manchester.

Rail—Great Central, Wombwell Station.

Canal—Dearne and Dove.

Mitchell Main Gas Coal.

Class of Coal—Gas.

Purified gas per ton	11,500	cubic feet
Illuminating power	18·10	std. candles
Illuminating matter per ton	713·65	lb. sperm
Coke per ton	1,468	lb.
Volatile matter	29·53	per cent.
Ash (faint red colour)	4·5	per cent.
Fixed combustible matter	64·30	per cent.
Total sulphur	1·53	per cent.
Moisture at 100 degs. Cent.	1·67	per cent.

The sample of coal was very free from visible iron pyrites or sulphate of lime, and is a good one for gasmaking purposes. The coke resulting therefrom is of good quality.

Analyst—Frank Scudder.

Date of Analysis—April 27, 1903.

Notes.

YORKSHIRE.

JOHN NAYLOR AND CO. LIMITED,

Ossett, R.S.O.

Colliery—PILDACRE, Flockton Seam, Flockton Pit.
Shipping Ports—Hull and Goole.
Rail—G.N.R., Ossett Station.
Canal—None.

Flockton Coal (Unscreened).

Class of Coal—Gas.

Specific gravity of coal (water as 1·000) ..	1·278	
Weight of 1 cubic foot	79·75	lb.
The yield of purified gas per ton of 2,240 lb., at a temperature of 60 degs. F., the barometer at 30 in.	11,000	cubic feet
The illuminating power of the gas by a London standard Argand burner is equal to standard sperm candles, each consuming 120 grains per hour, the burner consuming 5 cubic feet of gas per hour	16·0	candles
The value of the illuminating matter contained in 1 ton of gas obtained is equal to	600·04	lb. sperm
Coke, red, per ton	13	cwt.
Coke, slacked out, per ton (drained 12 hds.) ..	16 cwt.	3 qr. 27 lb.
Ammoniacal liquor per ton	17.31	gallons
Specific gravity	on 1·022	4½ degs. Twaddell
Tar per ton	12·10	gallons
Specific gravity	on 1·140	28 degs. Twaddell
Ash in coal	3·2	per cent.
Sulphur in coal	1·4	per cent.

Analyst—Robt. I. Tootill.

Date of Analysis—April 24, 1891.

Flockton Coal (Screened).

Class of Coal—Gas.

Specific gravity of coal (water as 1·000) ..	1·278	
Weight of 1 cubic foot	79·6	lb.
Yield of purified gas per ton of 2,240 lb., at a temperature of 60 degs. Fahr., the barometer at 30 in.	12,000	cubic feet

YORKSHIRE.

Notes

The illuminating power of the gas by a London standard Argand burner is equal to standard sperm candles, each consuming 120 grains per hour, the burner consuming 5 cubic feet of gas per hour	16·5 candles
The value of the illuminating matter contained in 1 ton of gas obtained is equal to.. ..	678·54 lb. sperm
Coke, red, per ton	12 cwt. 3 qr. 18 lb.
Coke slacked out per ton (drained 12 hds.) ..	16 cwt. 3 qr.
Ammoniacal liquor per ton	18·00 gallons
Specific gravity	on 1·022 4½ degs. Twadd.
Tar per ton	12·11 gallons
Specific gravity	on 1·140 28 degs. Twadd.
Ash in coal	2·25 per cent.
Sulphur in coal	1·2 per cent.

Analyst—Robt. I. Tootill.

Date of Analysis—April 24, 1891.

Pildacre Gas Coal.

Class of Coal—Gas.

	Per cent.	Lb. per ton.
Moisture (given off at 212 degs. Fahr.) ..	0·61 ..	13·664
Volatile matter (at red heat)	43·37 ..	971·488
Fixed matter (coke and ash)	56·02 ..	1,254·848
	100·00	2,240·000
Containing ash	9·67 ..	216·61
Total sulphur in coal	2·07 ..	46·36

Analysed in a model gas apparatus, one-hundredth ton, or 22·4 lb., of coal give :—

Tar	11·71 per cent. ..	262·50 lb. per ton
Ammoniacal liquor (2·2 Twad., 4·4 oz. strength)	5·85 degs. ..	131·25 degs.
Containing real ammonia	0·95 per cent. ..	21·36 lb. per ton
Coke	57·05 per cent. ..	1,278·12 lb. per ton
Yield of gas per ton (bar. 30 in., temperature 60 degs. Fahr.)		11,575·0 cubic feet
Illuminating power of gas per 5 cubic feet of gas		28·5 std. candles
Giving value of gas in sperm		1,131·0 lb.
Sulphur in gas, after passing through lime purifier, per 100 cubic feet		18·38 grains

Analyst—Thomas Fairley.

Date of Analysis—May 8, 1893.

Notes.

YORKSHIRE.

NEW SILKSTONE AND HAIGH MOOR COAL COMPANY LIMITED,

Castleford.

Colliery—ALLERTON BYWATER, ... Seam, Silkstone Pit.

Shipping Ports—Hull, Goole.

Rail—North-Eastern, Ledstone Station.

Canal—Aire and Calder.

Special Gas Coal.

Class of Coal—Gas.

Chemical analysis—	Per cent.	Lb. per ton.
Moisture (given off at 212 degs. Fahr.)	4·85	108·64
Volatile matter (at red heat)	35·07	785·56
Fixed matter (coke and ash)	60·08	1,345·79
Ash in coke	3·13	70·11
Total sulphur in coal	1·27	28·45

Practical results—

Yield of gas per ton (temperature 60 degs. Fahr., 30 in. bar.)	12,148·6 cubic feet
Illuminating power of gas per 5 cubic feet of gas in 24-hole burner	19·66 std. candles
Giving value of sperm	818·80 lb.

	Per cent.	Lb. per ton.
Coke	60·96	1,365·60
Ash in coke	5·69	127·45
Sulphur	0·90	20·16
Tar	7·11	159·40
Ammoniacal liquor (2·2 degs. Twaddell, 4·4 oz. strength), containing real ammonia	Degs. 7·53	Degs. 168·70

Analyst—Thos. Fairley, F.R.S.E.

Date of Analysis—August 5, 1897.

Best Silkstone Gas Coal.

Class of Coal—Gas.

The coal is black, possesses an exceptionally high lustre, with brown streak; fracture highly resinoid, with some slight deposits of charcoal; cross-fracture angular and resinoid, but in part laminated and semi-scalariform; the whole contains slight deposits of calcium carbonate and ferric bisulphide in the natural partings; moderately

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Notes.

cohesive and compact; on the fire it intumesces and agglomerates; colour of ash, dark brown; mean specific gravity, 1·238 (water 1·000); weight of 1 cubic foot, 77·37 lb.

	Per cent.	
Chemical analysis—		
Volatile matters (containing 0·56 of sulphur)	35·37	
Coke, consisting of — carbon 56·50, sulphur 0·23, ash 2·80 ..	59·53	
Water expelled at 212 degs. F. ..	5·10	
	100·00	
Practical results (gaseous products)—		
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	11,785	cubic feet
Gas from 1 cubic foot of the coal	407·05	cubic feet
Specific gravity of the gas	·486	(air 1·000)
Hydrocarbons absorbed by bromine ..	6·20	per cent.
Durability of 1 cubic foot by 5 in. jet flame	43 min. 8 sec.	
Value of 1 cubic foot of gas in sperm ..	483·60	grains
Value of gas from 1 ton of coal in sperm	814·17	lb.
Illuminating power of gas in standard candles (per London Argand)	20·15	candles
Sulphuretted hydrogen (H_2S) in foul gas	1·50	per cent.
Carbonic acid (CO_2) in foul gas	2·75	per cent.
Carbonic oxide (CO) in foul gas	6·00	per cent.
Sulphur eliminated with volatile products	15·01	lb.
Liquid products—		
Tar per ton of coal	15·70	gallons
Ammoniacal liquor, per ton of coal ..	19·80	gallons
Strength of ammoniacal liquor	2·50	degs. Twad.
Hygrometric water, per ton of coal ..	11·42	gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	7·20	per cent.
Solid products—		
Coke per ton of coal	1,333·47	lb.
Carbon in the coke	95·30	per cent.
Ash in the coke	4·70	per cent.
Sulphur in coke per ton of coal	5·15	lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	13·09	lb.

This is a remarkably good coal of its class, for the production of gas and coke. Of the former it yields a large volume of 20·15 candle value, and of the latter about 12 cwt., of the finest quality.

Analyst—Geo. R. Hislop, F.C.S., &c.

Date of Analysis—May 10, 1895.

Notes.

YORKSHIRE.

Colliery—ALLERTON BYWATER, ... Seam, Flockton Pit.

Best Flockton Gas Coal.

Class of Coal—Gas.

The coal is black, possesses considerable lustre and brown streak; fracture irregular and partly defined by deposits of charcoal, but chiefly resinoid; cross-fracture angular and resinoid with natural vertical partings, dividing into plates and containing deposits of calcium carbonate and ferric bisulphide; moderately cohesive and compact; on the fire it intumesces and agglomerates; colour of ash, brown: mean specific gravity, 1·208 (water 1·000); weight of 1 cubic foot, 75·5 lb.

		Per cent.
Chemical analysis—		
Volatile matters (containing 0·46 of sulphur)		35·56
Coke, consisting of—		
Carbon	57·11	
Sulphur	0·16	
Ash	1·72	
		58·99
Water expelled at 212 degs. Fahr... ..		5·45
		100·00

Practical results (gaseous products)—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	11,625 cubic feet
Gas from 1 cubic foot of the coal . ..	391·82 cubic feet
Specific gravity of the gas	·502 (air 1·000)
Hydrocarbons absorbed by bromine ..	6·25 per cent.
Durability of 1 cubic foot by 5 in. jet flame	43 mins. 28 secs.
Value of 1 cubic foot of gas in sperm ..	494·40 grains
Value of gas from 1 ton of coal in sperm	821·06 lb.
Illuminating power of gas in standard candles (per London Argand)	20·60 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·30 per cent.
Carbonic acid (CO_2) in foul gas	2·70 per cent.
Carbonic oxide (CO) in foul gas	9·00 per cent.
Sulphur eliminated with volatile products	10·30 lb.
Liquid products—	
Tar per ton of coal	16·10 gallons
Ammoniacal liquor per ton of coal ..	20·20 gallons
Strength of ammoniacal liquor .. .	2·40 degs. Twad.
Hygrometric water per ton of coal ..	11·76 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	7·80 per cent.

YORKSHIRE.

Notes.

Solid products—

Coke per ton of coal..	1,321·37 lb.
Carbon in the coke (very pure)	97·10 per cent.
Ash in the coke	2·90 per cent.
Sulphur in coke per ton of coal	3·58 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	13·34 lb.

This is one of the best bituminous coals for the production of gas and coke that I have examined ; in addition to a large volume of 20·6 candle gas, it affords 11·8 cwt. per ton of remarkably pure coke.

Analyst—Geo. R. Hislop, F.C.S., &c.

Date of Analysis—May 11, 1895.

Steam Coal.

Class of Coal—Steam.

	Per cent.
Ash	3·12
Sulphur	1·38
Volatile hydrocarbons	36·77
Water	5·67
Fixed carbon, by difference ..	53·06
	100·00

Water evaporated from 212 degs. Fahr. by combustion of 1 lb. of the coal (by Thomson's calorimeter)	13·54 lb.
Equals	7,270 calories

The ash is low and the evaporation power good. I consider it a valuable steam coal.

Analyst—Wm. McD. Mackey, F.I.C.

Date of Analysis—May 19, 1896.

Notes.

YORKSHIRE.

NEWTON, CHAMBERS AND CO. LIMITED,

Thorncliffe, near Sheffield.

Colliery— . . . . . Seam, ... Pit.
Rail— . . . . . Station.
Canal— . . . . . .

Thorncliffe Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal	12,500 cubic feet
Yield of coke per ton of coal	1,432 lb.
Ash in coke..	2·32 per cent.
Specific gravity of coal	1·266
Condensation by bromine	4 per cent.
Illuminating power	14·45 sperm candles
Value of 1 cubic foot in sperm	347 grains
Value of gas per ton of coal	605·33 lb. sperm
Gas purified by 1 cwt. of lime	16,000 lb.

Results obtained by seven days' ordinary working:—

Quantity carbonised	672 tons of 20 cwt.
Purified gas per ton at 60 degs. Fahr.	11,110 cubic feet
Coke, of very good quality, per ton of 20 cwt. of coal	14 cwt.
Average illuminating power of gas by the London standard burner	18·06 candles

Analyst— . . . . .
Date of Analysis— . . . . . .

NUNNERY COLLIERY COMPANY LIMITED,

Corn Exchange Buildings, Sheffield.

Colliery— . . . . . Seam, ... Pit.
Shipping Port— . . . . . .
Rail— . . . . . Station.
Canal— . . . . . .

Screened Bright Gas Coal.

Class of Coal—Gas.

Purified gas per ton	11,450 cubic feet
Illuminating power	16·33 std. candles
Illuminating matter in sperm per ton	641·06 lb.
Weight of coke per ton	1,359 lb.

Notes.

YORKSHIRE.

Percentage of coke yielded	60·66	per cent.
Fixed carbon in coke	96·00	per cent.
Ash in coke	4·00	per cent.
Sulphur in coal	0·686	per cent.

Analysts—Thos. Newbigging and Sons.

Date of Analysis—May 1904.

Washed Gas Nuts.

Class of Coal—Gas.

Purified gas per ton	10,800	cubic feet
Illuminating power	17·42	std. candles
Illuminating matter in sperm per ton	645·03	lb.
Weight of coke per ton	1,406	lb.
Percentage of coke yielded	62·76	per cent.
Fixed carbon in coke	92·00	per cent.
Ash in coke	3·00	per cent.
Sulphur in coal	0·596	per cent.

Analysts—Thos. Newbigging and Sons.

Date of Analysis—May 1904.

Washed Pea Nuts.

Class of Coal—Gas.

Purified gas per ton	11,400	cubic feet
Illuminating power	16·13	std. candles
Illuminating matter in sperm per ton	630·48	lb.
Weight of coke per ton	1,422	lb.
Percentage of coke yielded	63·48	per cent.
Fixed carbon in coke	96·00	per cent.
Ash in coke	3·00	per cent.
Sulphur in coal	0·640	per cent.

Analysts—Thos. Newbigging and Sons.

Date of Analysis—May 1904.

Notes.

YORKSHIRE.

OLD SILKSTONE COLLIERIES LIMITED,

Dodworth, near Barnsley.

Colliery—OLD SILKSTONE, ... Seam, Dodworth Pit.
Shipping Ports—Keadby, Goole, Hull, Grimsby, Partington, Liverpool, &c.
Rail—Great Central, Dodworth Station.
Canal— . . . . . .

Old Silkstone Gas Coal.

Class of Coal—Gas.

Gas per ton of coal . .	11,353 cubic feet
Illuminating power	18·99 std. candles
Value of 1 cubic foot of gas in sperm	456 grains
Sperm value per ton of coal	739 lb.
Coke per ton of coal	1,447 lb.
Coke	64·61 per cent.
Tar per ton of coal	14·24 gallons
Ammoniacal liquor	26·60 gallons

Analyst—R. O. Paterson.

Date of Analysis—June 5, 1903.

Old Silkstone Cannel.

Class of Coal—Gas.

Practical results—

Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	13,000 cubic feet
Illuminating power of gas in standard sperm candles	23·5 candles
Coke	63 per cent.
Coke per ton of coal	1,411 lb.
Colour of ash	Light red grey

The above is a good cannel, and compares well with the Lancashire cannels for gasmaking purposes. It produces an excellent coke.

Analyst—W. J. Orsman.

Date of Analysis—October 10, 1901.

YORKSHIRE.

Notes

Colliery—STANHOPE SILKSTONE, ... Seam, Stanhope Silkstone Pit.

Shipping Ports—Keadby, Hull, Goole, Grimsby, Partington, Liverpool, etc.

Rail—Lancs. and Yorks., Darton Station.

Canal— . . . . . .

Stanhope Silkstone Gas Coal.

Class of Coal—Gas.

	Per cent
Water expelled at 212 degs. Fahr.	0·7
Volatile hydrocarbons	33·4
Fixed carbon	63·4
Ash	1·6
Sulphur	0·9
	100·0

Gas per ton of coal at 60 degs. Fahr. and 30 in bar.	12,500 cubic feet
Candle-power	16·17 candles
Coke per ton	64 per cent.

The above is an excellent coal for gas-making purposes, and also gives off easily a large yield of gas of high illuminating power. The coke is hard and well fused.

Analyst—W. J. Orsman.

Date of Analysis—October 10, 1902.

PRIMROSE MAIN COLLIERY COMPANY LIMITED,

Smithies, Barnsley.

Colliery—PRIMROSE MAIN, Winter Seam, Primrose Main Pit.

Shipping Ports—Hull, Goole, Grimsby, Partington, Garston.

Rail—Great Central, Staincross Station.

Canal—*Nil.*

Primrose Main Coal.

Class of Coal—Gas, Manufacturing, House.

		Per cent.
Volatile matters (containing 1·06 per cent. sulphur)		33·26
Coke, consisting of—		
Carbon	58·93	
Sulphur	0·27	
Ash	2·40	
		61·60
Water expelled at 212 degs. Fahr. ..		5·14
		100·00

Notes.

YORKSHIRE.

Primrose Main Coal—*cont.*

Gaseous products—		
Gas per ton of coal	11,200	cubic feet
Gas from 1 cubic foot of coal	345·9	cubic feet
Illuminating power of the gas in standard candles	18·55	candles
Value of 1 cubic foot of gas in sperm ..	454·8	grains
Value of gas from 1 ton of coal in sperm..	727·6	lb.
Sulphuretted hydrogen (H_2S) in foul gas	2·0	per cent.
Carbonic acid (CO_2) in foul gas	2·4	per cent.
Carbonic oxide (CO) in foul gas	1·0	per cent.
Sulphur eliminated with volatile products, per ton of coal	23·74	lb.
Liquid products—		
Tar per ton of coal	8·7	gallons
Ammoniacal liquor per ton of coal ..	27·5	gallons
Strength of ammoniacal liquor	4	degs. Twaddell
Hygrometric water per ton of coal ..	11·5	gallons
Solid products—		
Coke per ton of coal	1,380	lb.
Carbon in the coke	95·66	per cent.
Ash in the coke	3·89	per cent.
Sulphur in the coke per ton of coal ..	9·81	lb.

This coal is formed of bright black and dull black layers, with frequent traces of carbonate of lime. Longitudinal, cross, and vertical fractures are all very regular. It is easily broken into long, thin, deep, spiky-looking pieces. The coke is of an excellent quality, and suitable for all commercial purposes. Specific gravity=1·25 (water=1). One cubic foot weighs 78·12 lb.

Analyst—J. Hepworth.

Date of Analysis—April 17th, 1894.

SKINNER AND HOLFORD LIMITED,

Waleswood Collieries, near Sheffield.

Colliery—WALESWOOD, ... Seam, Flockton Pit.

Shipping Ports—Grimsby, Hull, Goole, Partington, Liverpool.

Rail—Great Central, Beighton Station.

Canal— . . . . . .

Flockton Gas Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

Notes.

YORKSHIRE.

The coal is black, possesses considerable lustre and brown streak; fracture intermittent and defined by slight deposits of charcoal. Cross-fracture columnar in natural partings, angular, and resinoid to crystalline, with deposits of calcium carbonate and ferric-bisulphide. Moderately cohesive and compact. Under distillation it intumesces and agglomerates, Colour of ash, pale brown. Thickness of seam, 48 in., and of very uniform density. Mean specific gravity, 1·231 (water 1·000). Weight of 1 cubic foot, 76·94 lb.

		Per cent.
Volatile matters (containing 0·55 of sulphur)		32·89
Coke, consisting of—		
Carbon	58·49	
Sulphur	0·18	
Ash	4·29	
		62·96
Water expelled at 212 degs. Fahr.		4·15
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	12,185 cubic feet
Gas from 1 cubic foot of the coal	418·97 cubic feet
Specific gravity of the gas	·486 (air 1·000)
Hydrocarbons absorbed by bromine	5·00 per cent.
Durability of 1 cubic foot by 5 in. jet flame	44 min. 48 sec.
Value of 1 cubic foot of gas in sperm	476·88 grains
Value of gas from 1 ton of coal in sperm	830·11 lb.
Illuminating power of gas in standard candles (per London Argand)	19·87 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·50 per cent.
Carbonic acid (CO_2) in foul gas	1·75 per cent.
Carbonic oxide (CO) in foul gas	12·32 lb.
Liquid products—	
Tar per ton of coal	15·12 gallons
Ammoniacal liquor per ton of coal	15·60 gallons
Strength of ammoniacal liquor	2·75 degs. Twaddell
Hygrometric water per ton of coal	9·29 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	5·80 per cent.
Solid products—	
Coke per ton of coal	1,410·30 lb.
Carbon in the coke	93·20 per cent.
Ash in the coke	6·80 per cent.
Sulphur in coke per ton of coal	4·03 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	12·80 lb.

Notes.

YORKSHIRE.

Flockton Gas Coal—*cont.*

Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas), this coal is equal to 61·28.

Analyst—Geo. R. Hislop.

Date of Analysis—May 16, 1903.

SOOTHILL WOOD COLLIERY COMPANY LIMITED,

Batley.

Colliery— . . . . . Seam, ... Pit.
Shipping Port— . . . . . .
Rail— . . . . . Station.
Canal— . . . . . .

Screened Low Moor Black Bed Coal.

Class of Coal— . . . . .

Specific gravity	1·29	
Purified gas per ton	11,300	cubic feet
Illuminating power of gas	19·54	std. candles
Illuminating matter in sperm per ton	757·03	lb.
Coke per ton	1,453	lb.
Coke per cent.	64·86	per cent.
Fixed carbon in coke	96·15	per cent.
Ash in coke	3·85	per cent.
Sulphur in coal	2·56	per cent.
Tar per ton of coal	10·0	gallons
Liquor per ton of coal (5 degs. Twaddell)	18·5	gallons

The coke is of excellent quality.

Analysts—Thos. Newbigging and Son, MM.Inst.C.E.

Date of Analysis—June 20, 1903.

YORKSHIRE.

Notes.

TERRY, GREAVES & CO.,

Old Roundwood Collieries, Wakefield.

Colliery—OLD ROUNDWOOD, ... Seam, Silkstone Pit.
Shipping Ports—Hull, Goole.
Rail—Great Northern, Flushdyke Station.
Canal—*Nil.*

Old Roundwood Silkstone Coal.

Class of Coal—Gas, Manufacturing, House.

The following is an analysis made for gasmaking purposes :—

	Per cent.	Lb. per ton.
Moisture (given off at 212 degs. Fahr.)	1·30	29·12
Volatile matter (at red heat)	35·94	805·06
Fixed matter (coke and ash)	62·76	1,405·82
	100·00	2,240·00

	Per cent.	Lb. per ton.
Containing ash	1·24	27·77
Total sulphur in coal	0·94	21·56

Analysed in a model gas apparatus, one-hundredth ton, or 22·4 lb. of coal, gave :—

	Per cent.	Lb. per ton.
Tar	6·00	134·40
Ammoniacal liquor (3·0 Twaddell, 6 oz. strength)	5·30	118·80
Containing real ammonia	1·30	29·12
Coke	64·44	1,443·50
Yield of gas per ton	11,600 cubic feet	
Illuminating power of gas per 5 cubic feet of gas	19·65 std. candles	
Giving value of gas in pounds of sperm	781·52	
Sulphur in gas, after passing through lime purifier, per 100 cubic feet	21·56 grains	

Analyst—Thomas Fairley.
Date of Analysis—April 10, 1889.

Another analysis gave :—

	Per cent.
Carbon in coal	79·90
Ash	2·58
Sulphur	1·95
Oxygen	8·27
Nitrogen	2·10
Hydrogen	5·20
Specific gravity of coal (water as 1·00)	1·27
Weight of 1 cubic foot	79·37 lb.

Analyst—Robt. I. Tootill.
Date of Analysis—March, 1891.

Notes.

YORKSHIRE.

Colliery—OLD ROUNDWOOD, ... Seam, Cannel Pit.

Old Roundwood Cannel Coal.

Class of Coal— . . . . . .

	Per cent.	Lb. per ton.
Moisture (given off at 212 degs. Fahr.)	0·79	17·69
Volatile matter (at red heat)	42·04	941·70
Fixed matter (coke and ash)	57·17	1,280·61
	100·00	2,240·00
Containing ash	10·85	243·04
Total sulphur in coal	2·32	51·97

Analysed in a model gas apparatus, one-hundredth ton, or 22·4 lb. of coal, gave :—

	Per cent.	Lb. per ton.
Tar	10·46	234·40
Ammoniacal liquor (3·8 Twaddell, 7·6 oz. strength)	4·32	96·90
Containing real ammonia	1·64	39·36
Coke	58·73	1,315·60
Yield of gas per ton	12,100 cubic feet	
Illuminating power of gas per 5 cubic feet of gas	28·04 std. candles	
Giving value of gas in sperm	1,164·60 lb.	
Sulphur in gas after passing through lime purifier, per 100 cubic feet	14·42 grains	

Analyst—Thomas Fairley.

Date of Analysis—April 10, 1889.

Cannel Jonnies or Hub.

Class of Coal—Gas.

Analysis made for gasmaking purposes—	Per cent.	Lb. per ton.
Moisture (given off at 212 degs. Fahr.)	0·97	21·728
Volatile matter (at red heat)	35·05	785·120
Fixed matter (coke and ash)	63·98	1,433·152
	100·00	2,240·000
Containing ash	44·05	986·72
Total sulphur in coal	1·71	38·30

Analysed in a model gas apparatus, one hundredth ton, or 22·4 lb. of coal, gave :—

YORKSHIRE.

Notes.

	Per cent.	Lb. per ton.
Tar	8·92	200·00
Ammoniacal liquor (3·1 Twaddell, 6·2 oz. strength)	3·76	84·37
Containing real ammonia	1·34	30·01
Coke	62·77	1,406·25
Yield of gas per ton (bar. 30 in., temperature 60 degs. Fahr.)	8,950·0 cubic feet	
Illuminating power of gas per 5 cubic feet of gas	28·9 standard candles	
Giving value of gas in sperm	886·81 lb.	
Sulphur in gas, after passing through lime purifier, per 100 cubic feet	14·38 grains	

Analyst—Thomas Fairley.

Date of Analysis—March 20, 1893.

Snapethorpe Coal.

Class of Coal—Gas.

Analysis made for gas-making purposes:—	Per cent.	Lb. per ton.
Moisture (given off at 212 degs. Fahr.)	1·25	28·00
Volatile matter (at red heat)	36·70	822·08
Fixed matter (coke and ash)	62·05	1,389·92
	100·00	2,240·00
Containing ash	13·70	306·88
Total sulphur in coal	2·67	59·81

Analysed in a model gas apparatus, one-hundredth ton, or 22·4 lb. of coal, gave:—

	Per cent.	Lb. per ton.
Tar	9·20	206·25
Ammoniacal liquor (2·6 Twad., 5·2 oz. strength)	5·58	125·00
Containing real ammonia	1·12	25·088
Coke	65·70	1,471·87
Yield of gas per ton (bar. 30 in., temp. 60 degs. Fahr.)	10,187·8 cubic feet	
Illuminating power of gas per 5 cubic feet of gas	20·9 std. candles	
Giving value of gas in sperm	730·02 lb.	
Sulphur in gas, after passing through lime purifier, per 100 cubic feet	13·74 grains	

Analyst—Thomas Fairley.

Date of Analysis—March 20, 1893.

Notes.

YORKSHIRE.

VICTORIA COAL AND COKE COMPANY LIMITED,

Southgate House, Wakefield.

Colliery—PARKHILL, Haighmoor Seam, Haighmoor Pit.

Shipping Ports—Goole, Hull.

Rail—Lancashire and Yorkshire, Wakefield Station.

Canal—Aire and Calder Navigation.

Gas Nuts.

Class of Coal—Gas, Steam, Manufacturing, House.

The coal contains—

	Per cent.	Lb. per ton.
Moisture (given off at 212 degs. Fahr.)	2·69	60·25
Volatile matter (at red heat)	34·70	777·28
Fixed matter (coke and ash)	62·61	1,402·47
	100·00	2,240·00
Containing ash	8·89	199·13
Total sulphur in coal	1·51	33·82

Analysed in a model gas apparatus, one-hundredth ton, or 22·4 lb. of coal, give :—

	Per cent.	Lb. per ton.
Tar	8·94	200·31
Ammoniacal liquor (2·4 degs. Twaddell, 4·8 oz. strength)	5·58	125·00
Containing real ammonia	1·04	23·29
Coke	62·77	1,406·25
Yield of gas per ton	10,459 cubic feet	
Illuminating power of gas per 5 cubic feet of gas	18·5 standard candles	
Giving value in sperm	663·39 lb.	
Sulphur in gas after passing through lime purifiers per 100 cubic feet	15·37 grains	

Analyst—Thomas Fairley, F.R.S.E.

Date of Analysis—May 5, 1891.

Notes.

YORKSHIRE.

Colliery—PARKHILL, Silkstone Seam, Silkstone Pit.

Silkstone Gas Coal (Screened and Unscreened).

Class of Coal—Gas, Steam, Manufacturing, House.

Proximate analysis :—		
Moisture	1·15	per cent.
Volatile products	32·54	per cent.
Fixed carbon	60·76	per cent.
Sulphur	1·59	per cent.
Ash	3·96	per cent.
Specific gravity	1·301	
Weight of 1 cubic foot of coal	81·30	lb.
Space occupied by 1 ton	27·55	cubic feet
Commercial analysis—		
Gas per ton of coal	11,247	cubic feet
Gas per cubic foot of coal	408	cubic feet
Illuminating power	18·47	std. candles
Value of 1 cubic foot of gas in sperm	443	grains
Sperm value per ton of coal	712	lb.
Coke per ton of coal	13·17	cwt.
Coke	65·86	per cent.
Ash in the coke	6·01	per cent.
Sulphur eliminated with the volatile products	16·00	lb.
Sulphur in the coke (per ton)	19·68	lb.
Tar per ton of coal	13·34	gallons
Liquor per ton of coal	29·74	gallons

Analyst—R. O. Paterson.

Date of Analysis—January 27, 1903.

Colliery—PARK HILL, Stanley Main Seam, Stanley Main Pit.

Screened Steam Coal.

Class of Coal—Steam, Manufacturing, House.

The coal contains—	Per cent.
Moisture (given off at 212 degs. F.)	5·19
Volatile matter (at red heat)	33·55
Fixed matter (coke and ash)	61·26
	100·00
Containing coke	57·88
Containing also ash	3·38
Total sulphur in coal	1·30

Notes.

YORKSHIRE.

Screened Steam Coal—*cont.*

Burnt in Thompson's calorimeter the coal gives 14,319 units of heat —that is, it will raise 14,319 lb. of water through one degree Fahr., or it would evaporate 14·84 lb. of water at 212 degs. Fahr.

I find that this coal is of good quality for steam-producing and heating purposes. Its heating power has been carefully tested by repeated experiments in the calorimeter, and in this respect it compares favourably with the majority of other coals of the same class which I have tested. It is comparatively free from excess of sulphur, ash, or other injurious constituents.

Analyst—Thomas Fairley, F.R.S.E.

Date of Analysis—November 11, 1891.

WHARNCLIFFE SILKSTONE COLLIERY COMPANY LIMITED,

Tankersley, near Barnsley.

Colliery—WHARNCLIFFE SILKSTONE, ... Seam, ... Pit.

Shipping Ports—Hull, Goole, Grimsby, Liverpool, Partington

Rail—Great Central, Midland, Berdwell Station.

Canal—None.

Wharncliffe Silkstone Gas Coal.

Class of Coal—Gas, Coking, Steam, Manufacturing, House.

The coal contains—	Per cent.	Lb. per ton.
Moisture (given off at 212 degs. Fahr.)	1·50	33·600
Volatile matter (at red heat)	34·87	781·088
Fixed matter (coke and ash)	63·63	1,425·312
	100·00	2,240·000
Containing ash	2·45	54·880
Total sulphur in coal	1·55	34·720

Analysed in a model gas apparatus, one-hundredth ton, or 22·4 lb. of coal, give—

	Per cent.	Lb. per ton.
Tar	8·78	196·87
Ammoniacal liquor (2·40 Twaddell, 4·80 oz. strength)	5·30	118·75
Containing real ammonia	1·04	23·29
Coke	64·73	1,450·00

YORKSHIRE.

Notes.

Yield of gas per ton (bar. 30 in., temp. 60 degs. Fahr.	11,513·6 cubic feet
Illuminating power of gas in standard candles, per 5 cubic feet of gas.. ..	18·6 candles
Giving value of gas in sperm	734·2 lb.
Sulphur in gas after passing through lime purifiers per 100 cubic feet	18·02 grains

Analyst—Thomas Fairley.

Date of Analysis—February 25, 1895.

WHARNCLIFFE WOODMOOR COLLIERY COMPANY LIMITED,

Carlton, near Barnsley.

Colliery—WHARNCLIFFE WOODMOOR, Kents Thick Seam, ... Pit.

Shipping Ports—Hull, Goole, Grimsby, Birkenhead, Partington, &c.

Rail—Midland, Great Central, Hull and Barnsley, Barnsley Station.

Canal—Aire and Calder.

Wharncliffe Woodmoor Steam Coal.

Class of Coal—Steam.

Specific gravity (water as 1) ..	1·271
Weight of 1 cubic foot	79·4 lb.

Absolute calorific value and evaporating power represented in pounds of water at 212 degs. Fahr. capable of being turned into steam by the thorough combustion of 1 lb. of coal, 15·45 lb.

	Per cent.
Carbon	81·4
Sulphur	0·7
Ash	2·9
Hydrogen ..	4·1
Oxygen	8·2
Nitrogen	2·7

Analyst—R. J. Toothill, Manchester.

Date of Analysis— . . . . . , 1890.

Notes.

YORKSHIRE.

Wharncliffe Woodmoor Gas Coal.

Class of Coal—Gas.

Yield of gas per ton of coal	11,760 cubic feet
Illuminating power	17·44 std. sp. candles
Coke per ton of coal	1,367 lb.
Sulphur	0·96 per cent.
Ash	1·96 per cent.
Ammoniacal liquor per ton of coal	19·7 gallons
Tar per ton of coal	12·2 gallons

Analyst—R. O. Paterson, C.E., Cheltenham Gas Works.
Date of Analysis—August 8, 1894.

WOMBWELL MAIN COLLIERY COMPANY LIMITED,

near Barnsley.

Colliery—WOMBWELL MAIN COMPANY LIMITED, Barnsley and Parkgate Seams, Wombwell Main Pit.
Shipping Ports—Hull, Grimsby, Goole.
Rail - Great Central and Midland, Wombwell (Midland Railway) Station.
Canal— . . . . . .

Wombwell Main Steam Coal.

Class of Coal—Steam.

Coke—	Per cent.
Carbon	66·30
Ash	3·50
Tar	14·90
Gas water	0·60
Carbonic acid	0·20
Sulphuretted hydrogen	0·06
Gas	14·44
	100·00

Ultimate analysis—	Per cent.
Carbon	85·91
Hydrogen	5·55
Nitrogen	1·83
Oxygen	2·39
Sulphur	0·82
Ash	3·50
	100·00

Analyst—Thomas Richardson.
Date of Analysis— . . . . . , 1858.

YORKSHIRE.

Notes.

Wombwell Main House and Gas Coal.

Class of Coal—House, Gas.

Coke—	Per cent.
Carbon	64·20
Ash	2·05
Tar	15·95
Gas water	0·60
Carbonic acid	0·30
Sulphuretted hydrogen	0·05
Gas	16·85
	100·00

Ultimate analysis—	Per cent.
Carbon	88·62
Hydrogen	5·77
Nitrogen	0·93
Oxygen	2·12
Sulphur	0·56
Ash	2·00
	100·00

Analyst—Thomas Richardson.

Date of Analysis— . . . . . , 1858.

Wombwell Main Gas Coal.

Class of Coal—Gas.

Gas per ton of coal	11,390 cubic feet
Gas per cubic foot of coal	409 cubic feet
Illuminating power of the gas in standard sperm candles	17·58 candles
Value of 1 cubic foot of the gas in sperm	422 grains
Sperm value per ton of coal	686 lb.
Coke per ton of coal	1,496 lb.
Coke per cent. of coal	66·78 per cent.
Ash in coke	5·57 per cent.
Sulphur eliminated with the volatile products	9·4 lb.
Sulphur in coke	18·8 lb.
Tar per ton of coal	11·68 gallons
Liquor	17·28 gallons
Specific gravity	1·285
Weight of 1 cubic foot of the coal	80·3 lb.
Space occupied by 1 ton	27·9 cubic feet

Analyst—R. O. Paterson.

Date of Analysis— . , 1895.

SCOTLAND

Notes.

ARGYLL.

CAMPBELTOWN COAL COMPANY LIMITED,

Campbeltown.

Colliery—ARGYLL, Main Seam, Wimbledon Pit.
Shipping Port—Campbeltown.
Rail—Campbeltown and Machrihanish Light Railway Company, Campbeltown Station.
Canal—*Nil.*

Argyll Coal.

Class of Coal—Manufacturing.

	Per cent.
Carbon	65·71
Hydrogen	4·02
Oxygen	9·37
Nitrogen	0·96
Sulphur	0·58
Ash	5·00
Moisture	14·36
	100·00

Analyst—Robert R. Tatlock, F.R.S.E., F.C.S.
Date of Analysis—1884.

AYRSHIRE.

CAPRINGTON AND AUCHLOCHAN COLLIERIES,

Kilmarnock.

Colliery—CAPRINGTON, McNaught Seam, No. 42 Pit.
Shipping Ports—Troon, Ayr.
Rail—Glasgow and South-Western, Gatehead (near Kilmarnock) Station.
Canal— . . . . . .

McNaught Caprington Steam and House Coal.

Class of Coal—Steam, House.

A sample of this coal gave on analysis the following results:—

The coal is black, possesses considerable lustre and slightly brown streak; fracture irregular and intermittent, partly defined by thin deposits of charcoal; cross-fracture angular, partly cubical, resinoid,

Notes.

AYRSHIRE.

McNaught Caprington Steam and House Coal—*cont.*

and crystalline, with considerable deposits of calcium carbonate in the natural partings; moderately cohesive and compact; under heat it intumesces and agglomerates moderately; colour of ash, reddish-brown; thickness of seam, 34 in.; mean specific gravity, 1·299 (water 1·000); weight of 1 cubic foot, 81·10 lb.

Proximate analysis: The coal, when heated to 2,000 degs. Fahr., yields:—

	Per cent.	Lb. per ton.
Volatile matters	36·65	820·960
Fixed carbon	51·56	1,154·944
Ash	4·14	92·736
Sulphur	0·79	17·696
Moisture	6·86	153·664
	100·00	2,240·000
Coke	55·90	1,252·160

Ultimate analysis: constituents of coal:—

	Per cent.
Carbon	71·16
Hydrogen	4·93
Nitrogen	0·76
Oxygen	11·36
Sulphur	0·79
Ash	4·14
Hygroscopic water	6·86
	100·00

Calorific (or heat-producing) power of the coal, as determined by Thomson's calorimeter: 1 lb. of the coal by perfect combustion evolves heat sufficient to convert 12·86 lb. of water from 212 degs. Fahr. into steam; 1 lb. will therefore raise 12,422 lb. of water 1 deg. Fahr. in temperature, or equal to 69·01 lb. of water from 32 degs. to 212 degs. Fahr., or equal to 87·71 lb. of water from 60 degs. to 212 degs. Fahr., or equal to 11·11 lb. of water from 60 degs. to 212 degs. Fahr., thence into steam.

This is a very good and useful coal, alike for steam-raising, household use, and general heating purposes, containing as it does about 76 per cent. of heat-producing elements, with a theoretical heating power equivalent to 13·12 lb. of water converted into steam from 212 degs. Fahr. In the furnace or on the fire it burns freely under a moderate draught, and produces a very intense and long-sustained heat. The coal contains about the average amount of sulphur and water and a very moderate percentage of ash.

Analyst—Geo. R. Hislop, F.C.S., &c.

Date of Analysis—December 28, 1901.

AYRSHIRE.

Notes.

Colliery—CAPRINGTON, McNaught Seam, No. 42 Pit.

McNaught Caprington Coal.

Class of Coal—House.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

The coal is black, possesses considerable lustre and slightly brown streak ; fracture, rather irregular, partly defined by deposits of charcoal and laminated ; cross-fracture angular, partly cubical ; resinoid, and partly crystalline, with considerable deposits of calcium carbonate ; moderately cohesive and compact ; under distillation it intumesces and agglomerates ; colour of ash, reddish brown ; thickness of seam, 34 in. ; mean specific gravity, 1·299 (water 1·000) : weight of 1 cubic foot, 81·10 lb.

		Per cent.
Volatile matters (containing 0·59 of sulphur) ..		37·24
Coke, consisting of—		
Carbon	51·56	
Sulphur	0·20	
Ash	4·14	
		55·90
Water expelled at 212 degs. Fahr. ..		6·86
		100·00

Gaseous products :—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	10,945 cubic feet
Gas from 1 cubic foot of the coal ..	396·27 cubic feet
Specific gravity of the gas	·495 (air 1·000)
Hydrocarbons absorbed by bromine ..	5·20 per cent.
Durability of 1 cubic foot by 5 in. jet flame	40 min. 28 sec.
Value of 1 cubic foot of gas in sperm ..	439·68 grains
Value of gas from 1 ton of coal in sperm ..	687·47 lb.
Illuminating power of gas in standard candles (per London Argand)	18·32 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·75 per cent.
Carbonic acid (CO_2) in foul gas	5·25 per cent.
Carbonic oxide (CO) in foul gas	8·50 per cent.
Sulphur eliminated with volatile products	13·21 lb.
Liquid products :—	
Tar per ton of coal	14·75 gallons
Ammoniacal liquor per ton of coal	28·75 gallons
Strength of ammoniacal liquor ..	2·75 degs. Twaddell
Hygrometric water per ton of coal	15·36 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	10·42 per cent.

Notes.

AYRSHIRE.

McNaught Caprington Coal—*cont.*

Solid products :—

Coke per ton of coal	1,252·16 lb.
Carbon in the coke	92·60 per cent.
Ash in the coke	7·40 per cent.
Sulphur in coke per ton of coal	4·48 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	12·72 per cent.

While yielding a good average volume of 18·32-candle gas, this coal affords 11·18 cwt. of excellent coke per ton. Owing to the amount of calcium carbonate in the coal, the foul gas contains fully the average percentage of carbonic acid. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 46·31.

Analyst—George R. Hislop, F.C.S., &c.

Date of Analysis—December 25, 1901.

Colliery—CAPRINGTON, Parrot Seam, No. 42 pit.

Caprington Cannel Coal.

Class of Coal—Gas.

The coal is black, possesses considerable lustre and brown streak; fracture inclines to slaty undulating, and in part scalariform with impressions of stigmaria; cross-fracture conchoidal, partly angular, and containing some deposits of ferric bisulphide, calcium carbonate, and coating of fireclay in the natural partings; moderately cohesive and compact; under distillation it slightly intumesces; colour of ash, pale brown; thickness of seam, 10 in., and of very uniform density, mean specific gravity being 1·263 (water=1·000); weight of 1 cubic foot, 78·93 lb.

		Per cent.
Volatile matters (containing 0·56 of sulphur)		37·40
Coke, consisting of—		
Carbon	48·27	
Sulphur	0·23	
Ash	8·30	
		56·80
Water expelled at 212 degs. Fahr. ..		5·80
		100·000

AYRSHIRE.

Notes.

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	11,320 cubic feet
Gas from 1 cubic foot of the coal	398·88 cubic feet
Specific gravity of the gas	·540 (air 1·000)
Hydrocarbons absorbed by bromine ..	9·20 per cent.
Durability of 1 cubic foot by 5 in. jet flame	56 min. 18 secs.
Value of 1 cubic foot of gas in sperm ..	655·92 grains
Value of gas from 1 ton of coal in sperm..	1,060·71 lb.
Illuminating power of gas in standard candles	27·33 candles
Sulphuretted hydrogen (H_2S) in foul gas	2·00 per cent.
Carbonic acid (CO_2) in foul gas	4·00 per cent.
Carbonic oxide (CO) in foul gas	9·20 per cent.
Sulphur eliminated with volatile products	12·54 lb.
Liquid products—	
Tar per ton of coal	17·15 gallons
Ammoniacal liquor per ton of coal ..	22·50 gallons
Strength of ammoniacal liquor	2·50 degs. Twaddell.
Hygrometric water per ton of coal ..	12·99 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	7·56 per cent.
Solid products—	
Coke per ton of coal ..	1,272·32 lb.
Carbon in the coke	85·40 per cent.
Ash in the coke	14·60 per cent.
Sulphur in coke per ton of coal	5·15 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	11·73 lb.

This is an excellent second-class cannel coal. It is easily distilled, yields a considerable volume of 27·33-candle gas, and affords 11·36 cwt. of medium-quality coke per ton. The coal contains about the average amounts of water and sulphur. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 66·70.

Analyst—George R. Hislop, F.C.S., &c.

Date of Analysis—March 14, 1900.

Notes.

AYRSHIRE.

Colliery—CAPRINGTON, ... Seam, No. 41 Pit.

Anthracite or Blind Coal.

Class of Coal—Anthracite.

	Per cent.
Fixed carbon	83·9
Volatile matters	11·1
Ash	3·2
Water	1·8
	100·0

Coke	87·10 per cent.
Sulphur	0·54
Specific gravity	1·367
Weight of cubic foot	85 lb.
Heating power, pounds of water at 212 degs. F. evaporated by 1 lb. of coal	11·5 lb.

This anthracite is of superior quality.

Analyst—Dr. Wm. Wallace.

Date of Analysis— . . . . . , 1860.

A. FINNIE AND SON,

Kilmarnock.

Colliery—FERGUSHILL, Ell, Stone, Main, Turf, Lady Ha', and Wee Seams, Nos. 22, 23, 26, 28, 30 Pits.

Shipping Port—Ardrossan.

Rail—Kilwinning, Kilwinning Station.

Canal—None.

Fergushill Coals.

Class of Coal—Steam.

	Fergushill, Kilwinning.		
	Ell.	Stone.	Main.
Specific gravity	1·27	1·22	1·30
Yield of coke, per cent.	63·91	61·43	60·13
Coke from 1 lb. of coal converts water into steam	8·30	8·30	7·76
Composition in 100 parts—			
Carbon	80·77	75·07	75·78
Hydrogen	5·28	5·35	5·53
Oxygen	8·09	13·19	12·02
Nitrogen	1·33	1·13	1·06
Sulphur	1·14	1·88	1·65
Ash	3·39	3·38	3·96

Analyst—Hy. K. Bamber, F.C.S.

Date of Analysis—May 1, 1862.

AYRSHIRE.

Notes.

Fergushill Cannel Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal is black, possesses considerable lustre and brown streak; fracture irregular and partly scalariform; one half of seam highly resinoid and of bright lustre, with considerable deposits of calcic carbonate; rather friable and porous; on the fire it intumesces and agglomerates; colour of ash, pale brown and flocculent; thickness of seam, 9 in.; mean specific gravity, 1·225 (water 1·000); weight of 1 cubic foot, 76·56 lb.

		Per cent.
Volatile matters (containing 0·44 of sulphur)		37·67
Coke, consisting of—		
Carbon	51·65	
Sulphur	0·18	
Ash	2·85	
		54·68
Water expelled at 212 degs. Fahr... ..		7·65
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. F., and 30 in. bar.	10,750 cubic feet
Gas from 1 cubic foot of the coal	367·42 cubic feet
Specific gravity of the gas	·571 (air 1·000)
Hydrocarbons absorbed by bromine ..	8·50 per cent.
Durability of 1 cubic foot by 5 in. jet flame	49 min. 38 sec.
Value of 1 cubic foot of gas in sperm ..	578·80 grains
Value of gas from 1 ton of coal in sperm ..	888·99 lb.
Illuminating power of gas in standard candles	24·12 candles
Sulphuretted hydrogen (H_2S) in foul gas ..	1·25 per cent.
Carbonic acid (CO_2) in foul gas..	2·75 per cent.
Carbonic oxide (CO) in foul gas	9·75 per cent.
Sulphur eliminated with volatile products	9·85 lb.
Liquid products—	
Tar per ton of coal	15·90 gallons
Ammoniacal liquor per ton of coal	31·31 gallons
Strength of ammoniacal liquor	2·25 degs. Twadd.
Hygrometric water per ton of coal	17·13 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	9·85 per cent.
Solid products—	
Coke per ton of coal	1,224·83 lb.
Carbon in the coke	94·80 per cent.
Ash in the coke	5·20 per cent.
Sulphur in coke, per ton of coal..	4·03 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	13·02 lb.

Notes.

AYRSHIRE.

Fergushill Cannel Coal—*cont.*

This is an excellent coal of its class for the production of gas and coke. It is easily distilled, and contains a moderate amount of impurities. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 64·92.

Analyst—Geo. R. Hislop, F.C.S., F.I.Inst., F.R.S.S.A.
Date of Analysis—April 27, 1893.

Fergushill Shale.

Class of Coal—Gas.

A sample of this shale, representing the entire product of the seam, gave on examination the following results :—

The shale inclines to brownish black, with slight lustre and brown streak; fracture highly slaty with some small nodules of ferric carbonate; cross fracture angular and partly semi-conchoidal, with slight deposits of calcic carbonate; moderately cohesive, but very compact; thickness of seam, 6 in.; mean specific gravity, 1·515 (water 1·000); weight of 1 cubic foot, 94·68 lb.

		Per cent.
Volatile matters (containing 0·52 of sulphur) ..		31·04
Coke, consisting of—		
Carbon	21·72	
Sulphur	0·36	
Ash	44·64	
		66·72
Water expelled at 212 degs. Fahr. ..		2·24
		100·00

Gaseous products—	
Gas per ton of shale at 60 degs. Fahr., and 30 in. bar	10,075 cubic feet
Gas from one cubic foot of the shale ..	425·84 cubic feet
Specific gravity of the gas	·578 (air 1·000)
Hydrocarbons absorbed by bromine ..	10·75 per cent.
Durability of 1 cubic foot by 5 in. jet flame	63 min. 18 sec.
Value of 1 cubic foot of gas in sperm ..	728·64 grains
Value of gas from 1 ton of shale in sperm	1,048·72 lb.
Illuminating power of gas in standard candles	30·36 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·25 per cent.
Carbonic acid (CO_2) in foul gas	3·25 per cent.
Carbonic oxide (CO) in foul gas	11·00 per cent.
Sulphur eliminated with volatile products	11·65 lb.

AYRSHIRE.

Notes.

Liquid products—	
Tar per ton of shale..	13·25 gallons
Ammoniacal liquor per ton of shale ..	8·75 gallons
Strength of ammoniacal liquor	3·50 degs. Twadd.
Hygrometric water per ton of shale ..	5·01 gallons
Aqueous absorbent capacity of shale (determined by complete saturation)..	2·50 per cent.
Solid products—	
Coke per ton of shale	1,494·52 lb.
Carbon in the coke	33·10 per cent.
Ash in the coke	66·90 per cent.
Sulphur in coke per ton of shale	8·06 lb.
Heating power of one pound of coke (water from boiling point into steam)	4·54 lb.

This shale is easily distilled, and yields a moderate volume of 30·36 candle gas. It is very dry, and the foul gas contains a moderate percentage of impurities. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas), this shale is equal to 56·27.

Analyst—Geo. R. Hislop, F.C.S., M.S.C.Ind., F.R.S.S.A.
Date of Analysis—December 29, 1900.

Colliery—SPRINGHILL, McNaught, Tourha, Main, Splint and Ell Seams, Nos. 1, 2, 3 and 4 Springhill Pits, and Cauldhame Pit.
Shipping Port—Irvine.
Rail—Pregliorn, Springside Station.
Canal—None.

Springhill Ell Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

The coal possesses considerable lustre and brown streak ; fracture defined by laminæ of charcoal ; cross-fracture angular and partly resinoid with considerable deposits of calcic carbonate and traces of ferric bisulphide ; moderately cohesive but porous ; under distillation it intumesces and agglomerates ; colour of ash, pale brown ; thickness of seam, 24 in., including a 3 in. band of brown splint coal ; density, very uniform ; mean specific gravity being 1·240 (water 1·000) ; weight of 1 cubic foot, 77·5 lb.

Notes.

AYRSHIRE.

		Per cent.	
Springhill Ell Coal—*cont.*			
Volatile matters (containing 0·45 sulphur)		34·85	
Coke, consisting of—			
Carbon	52·26		
Sulphur	0·21		
Ash	4·48		
		56·95	
Water expelled at 212 degs. Fahr.		8·20	
		100·00	
Gaseous products—			
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.		10,830	cubic feet
Gas from 1 cubic foot of the coal		374·70	cubic feet
Specific gravity of the gas		·484	(air 1·000)
Hydrocarbons absorbed by bromine		5·20	per cent.
Durability of 1 cubic foot by 5 in. jet flame		44	min. 38 sec.
Value of 1 cubic foot of gas in sperm		482·40	grains
Value of gas from 1 ton of coal in sperm		746·34	lb.
Illuminating power of gas in standard candles (per London Argand)		20·10	candles
Sulphuretted hydrogen (H_2S) in foul gas		1·25	per cent.
Carbonic acid (CO_2) in foul gas		5·25	per cent.
Carbonic oxide (CO) in foul gas		5·75	per cent.
Sulphur eliminated with volatile products		10·08	lb.
Liquid products—			
Tar per ton of coal		15·50	gallons
Ammoniacal liquor per ton of coal		30·18	gallons
Strength of ammoniacal liquor		2·50	degs. Twadd.
Hygrometric water, per ton of coal		18·36	gallons
Aqueous absorbent capacity of coal (determined by complete saturation)		11·80	per cent.
Solid products—			
Coke per ton of coal		1,275·68	lb.
Carbon in the coke		92·14	per cent.
Ash in the coke		7·86	per cent.
Sulphur in coke per ton of coal		4·70	lb.
Heating power of 1 lb. of coke (water from boiling point into steam)		12·66	lb.

This coal yields about the average volume of gas from splint coals, and of grand quality, and at same time affords 11·39 cwt. of good coke per ton. It contains a very moderate percentage of sulphur, but fully the average amount of water and carbon dioxide. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 51·43.

Analyst—Geo. R. Hislop, F.C.S., M.S.C.Ind., F.R.S.S.A.

Date of Analysis—May 6, 1905.

AYRSHIRE. *Notes.*

GLENGARNOCK IRON AND STEEL COMPANY LIMITED,

127, St. Vincent Street, Glasgow.

Collieries—AUCHENHARVIE AND ARDEER, ... Seam, ... Pit.

Shipping Ports—Ardrossan and Irvine.

Rail—Caledonian and Glasgow & South-Western, Stevenston Station.

Canal—None.

Auchenharvie Turf Coal, Ardeer Steam Coal.

Class of Coal— . . . . . .

	Auchenharvie Turf Coal. House. Per cent.	Ardeer Steam Coal. Steam. Per cent.
Fixed carbon	57·80	55·00
Volatile gases, tar, &c.	34·05	33·40
Ash	2·10	6·00
Moisture	6·05	5·60
	100·00	100·00

Analyst—Robert Faulds.

Date of Analysis—October, 1906.

LANEMARK COAL COMPANY LIMITED,

New Cumnock.

Colliery—LANEMARK, Lanemark Cannel Seam, Lanemark Pit.

Shipping Port—Ayr.

Rail—Glasgow and South-Western, New Cumnock Station.

Canal—None.

Lanemark Cannel Coal.

Class of Coal—Gas.

Purified gas per ton	10,602 cubic feet
Illuminating power	29·23 sperm candles
Value of 1 cubic foot of gas	701·50 grains sperm
Value of gas from 1 ton of coal	1,062·30 lb. sperm
Specific gravity of gas (air 1·000)	·574
Yield of coke per ton of coal	1,241 lb.
Percentage of carbon in coke	89·50 per cent.

Analyst—Alexander Bell.

Date of Analysis—February 29, 1892.

Notes.

AYRSHIRE.

A. G. MOORE AND CO.,

142, St. Vincent Street, Glasgow.

Colliery—SHIELDMAINS, Main Coal Seam, Shieldmains Pit.

Shipping Port—Ayr.

Rail—Glasgow and South-Western, Drongan Station.

Canal— . . . . . .

Shieldmains Gas Coal.

Class of Coal—Gas.

A practical test made with one truckload at the Kilmarnock Gasworks gave the following results:—

	Cubic feet of gas.
First test of ½ cwt. coal produced	233
Second test of ½ cwt. coal produced	235
Total for 1 cwt. coal	468

This being at the rate of 9,360 cubic feet per ton of coal.

The average illuminating power of gas is about equal to 22 sperm candles. The coke is very good, containing only 5 per cent. of ash.

Analyst—H. Fairweather.

Date of Analysis—September 1, 1904.

Shieldmains House Coal.

Class of Coal—House, Steam.

	Per cent.	Per cent.
Volatile matter:—		
Gas, tar, &c.	40·41	
Sulphur	0·44	
Water	3·05	
		43·90
Coke:—		
Fixed carbon	52·44	
Sulphur	0·56	
Ash	3·10	
		56·10
		100·00
Heating power, practical, Playfair's formula (pounds of water at 212 degs. Fahr. evaporated by 1 lb. of coal)		8·07 lb.
Specific gravity		1·28
Weight of 1 cubic foot		80·00 lb.

These results show that this is an excellent coal in every respect, either for house or light steam purposes. Being remarkably free from ash, and even from sulphur, it is an exceedingly clean coal, and in every way well adapted for the purposes named.

Analyst—R. R. Tatlock and Thomson.

Date of Analysis—August 15, 1901.

Notes.

CLACKMANNAN.

ALLOA COAL COMPANY LIMITED,

Alloa.

Colliery—ALLOA, Five-foot and Splint Seams, Alloa, Devon, Tillicoultry, Sheriffyard and Brucefield Pits.

Shipping Port—Alloa.

Rail—North British and Caledonian, Alloa Station.

Canal—None.

Alloa Jewel Coal.

Class of Coal—Steam.

A. Mean specific gravity of the coal (water = 1·000) .. .. 1·259

Weight of 1 cubic foot of the coal .. 78½ lb.

B. Proximate analysis.—When heated the coal yields :—

	Per cent.
Volatile combustible matter ..	36·93
Fixed carbon	55·61
Ash	1·16
Sulphur	0·58
Moisture	5·72
	100·00
Coke	57·06

Weight of ash in 1 ton of coal .. 25·98 lb.

Weight of sulphur in 1 ton of coal 12·99 lb.

C. Ultimate analysis.—Constituents of the coal :—

	Per cent.
Carbon	78·19
Hydrogen	6·29
Nitrogen	1·49
Oxygen	6·57
Sulphur	0·58
Ash	1·16
Moisture	5·72
	100·00

D. The calorific or heat-producing power of the coal with the foregoing analysis is as follows :—

1 lb. weight of the coal during perfect combustion evolves heat sufficient to raise 14·016 lb. of water, 1 deg. Fahr. in temperature.

Notes.

CLACKMANNAN.

Alloa Jewel Coal—*cont.*

Equal to 77·87 lb. ($77\frac{4}{5}$) of water, from 32 to 212 degs. Fahr.,
or to 93·44 lb. ($93\frac{1}{2}$) ,, ,, 62 to 212 degs. Fahr.,
or to 12·57 lb. ($12\frac{1}{2}$) ,, ,, 62 to 212 degs. Fahr., and thence into steam,
or to 14·53 lb. ($14\frac{1}{2}$) ,, ,, 212 degs. Fahr. into steam.

This is an excellent steam coal. The ash is very small, and the true combustible elements—carbon and hydrogen—are very large. In all respects it is a first-class fuel for raising steam. In practical work, and allowing for imperfect combustion and loss of heat in ordinary furnaces, 1 lb. of the coal will evaporate fully 9 lb. of water into steam. Whilst it burns readily and gives off inflammable gas, it leaves a large proportion of brightly glowing cinders or coke which comes away, leaving a slight amount of ash. It is a very clean and free-burning steam coal.

Analyst—Stevenson McAdam, Ph.D., &c.
Date of Analysis—May 7, 1878.

Alloa Splint Steam Coal.

Class of Coal—Steam.

A. Mean specific gravity of the coal (water = 1·000) .. .. 1·273
Weight of 1 cubic foot of the coal .. $79\frac{1}{3}$ lb.

B. Proximate analysis (when heated the coal yields) :—

	Per cent.
Volatile combustible matter ..	35·85
Fixed carbon	54·79
Ash	4·46
Sulphur	0·34
Moisture	4·56
	100·00
Coke	59·42
Weight of ash in 1 ton of coal	99·9 lb.
Weight of sulphur in 1 ton of coal.. ..	7·61 lb.

C. Ultimate analysis (constituents of the coal) :—

	Per cent.
Carbon	76·48
Hydrogen	6·18
Nitrogen	1·52
Oxygen	6·46
Sulphur	0·34
Ash	4·46
Moisture	4·56
	100·00

CLACKMANNAN.

Notes.

D. The calorific or heat-producing power of the coal with the foregoing analysis is as follows:—

1 lb. of the coal during perfect combustion evolves heat sufficient to raise 13·575 lb. of water 1 deg. Fahr. in temperature.

Equal to 75·42 lb. ($75\frac{1}{2}$)	of water	from	32 to 212 degs. Fahr.,
or to 90·50 lb. ($90\frac{1}{2}$)	,,	,,	62 to 212 degs. Fahr.,
or to 12·18 lb. ($12\frac{1}{6}$)	,,	,,	62 to 212 degs. Fahr., and thence into steam.
or to 14·07 lb. (14)	,,	,,	212 degs. Fahr. into steam.

The coal is of excellent quality for the raising of steam. The proportion of ash in the coal is small, and there is a high percentage of carbon and hydrogen, which are the true heat-producing constituents of the coal. When used in furnaces the coal inflames readily, gives off inflammable gases, and then leaves an excellent coke, which continues to burn and evolve a high heat. Making due allowance for loss of heat in ordinary furnaces by the chimney and through imperfect combustion of the coal, the coal may be depended upon for the evaporation of 9 lb. of boiling water into steam during the combustion of each pound of coal.

Analyst—Stevenson McAdam, Ph.D., &c.

Date of Analysis—May 7, 1878.

Notes.

DUMBARTON.

J. AND A. F. WALLACE,

Kirkintilloch.

Colliery—WESTER GARTSHORE, Main Coal Seam, No. 2 Pit.
Shipping Ports—Queen's Dock and Bo'ness.
Rail—North British, Wester Gartshore Siding.
Canal—Forth and Clyde.

Wester Gartshore Steam Coals.

Class of Coal—Steam and Manufacturing.

	Main Coal. No. 1 Pit. Per cent.	Main Coal. No. 2 Pit. Per cent.	Wee Coal. No. 2 Pit. Per cent.
Volatile matters—			
Gas, tar, &c.	17·03	22·00	23·86
Sulphur	0·15	0·08	0·30
Water at 212 degs. Fahr.	2·46	2·31	2·14
Coke—			
Fixed carbon	77·19	73·39	69·52
Sulphur	0·16	0·06	0·43
Ash	3·01	2·16	3·75
	100·00	100·00	100·00
Volatile matter	19·64	24·39	26·3
Coke (dry)	80·36	75·61	73·7
Coke per ton of coal	16 c. 8 lb.	15 c. 13 lb.	14 c. 2 q. 27 lb.
Specific gravity of the coal	1·260	1·265	1·255
Weight of cubic foot	78½	79	78 lb.
Stowage space per ton	42·8	42·5	43 cubic ft.
Heating power (practical) in pounds of water at 212 degs. Fahr., converted into steam by the combustion of 1 lb. of coal	10·56	10·22	9·77 lb.

Composition of the coke (dry):—

	Main No. 1. Per cent.	Main No. 2. Per cent.	Wee No. 2. Per cent.
Carbonaceous or combustible matter	96·05	97·07	94·33
Sulphur	0·20	0·08	0·58
Ash	3·75	2·85	5·09
	100·00	100·00	100·00

Analyst—William Wallace.
Date of Analysis—November 26, 1878.

DUMBARTON.

Notes.

Another analysis of these coals by a firm of chemical manufacturers shows :—

	Main No. 1. Per cent.	Main No. 2. Per cent.	Wee No. 2. Per cent.
Volatile matter	18·6	20·65	21·0
Fixed carbon	76·8	75·60	72·4
Ash	3·0	2·00	6·0
Water	1·6	1·75	0·6
	100·0	100·00	100·0

Analyst—William Wallace.

Date of Analysis—November 26, 1878.

Colliery—WESTER GARTSHORE, Coking Coal (Kilsyth) Seam, No. 1 Pit.

Waterside Best House Coal and Nuts.

Class of Coal—Gas, Steam, and House.

Proximate analysis :—		Per cent.
Volatile matters—		
Gas, tar, &c.	31·47	
Sulphur	0·29	
Water, at 212 degs. Fahr.	2·16	
		33·92
Coke—		
Fixed carbon	63·60	
Sulphur	0·36	
Ash	2·12	
		66·08
		100·00

Coke per ton of coal	1,480 lb., or 13 cwt. 24 lb.
Specific gravity	1·280
Weight of 1 cubic foot	80 lb.
Space required for stowage, per ton	42 cubic feet

Analysis of the coke (dry)—	Per cent.
Carbonaceous or combustible matter	96·25
Sulphur	0·54
Ash	3·21
	100·00

Notes.

DUMBARTON.

Waterside Best House Coal and Nuts—*cont.*

Ultimate analysis of the coal—	Per cent.
Carbon	80·95
Hydrogen	5·43
Oxygen	7·22
Nitrogen	1·47
Sulphur	0·65
Ash	2·12
Water, expelled at 212 degs. Fahr.	2·16
	100·00

Calorific or heating power, theoretical or absolute, in pounds of water, at 212 degs. Fahr., converted into steam by 1 lb. of coal	14·97 lb.
Calorific or heating power, practical	9·25 lb.

Analyst—William Wallace.

Date of Analysis—August 6, 1886.

Coking Coal.

Class of Coal—Gas, Steam, and House.

	Top portion comprising 25 per cent. of seam.	Bottom portion comprising 75 per cent. of seam.
Volatile matters—		
Gas, tar, &c.	33·04	31·68
Sulphur	0·24	0·28
Water, at 212 degs. Fahr.	2·21	2·26
Coke—		
Fixed carbon	62·71	64·39
Sulphur	0·30	0·33
Ash	1·50	1·06
	100·00	100·00
Volatile matters	35·49	34·22
Coke	64·51	65·78
Coke, per ton	1,445	1,473 lb.
	Cwt. qrs. lb. or 12 3 17	Cwt. qrs. lb. 13 0 17
Specific gravity	1·276	1·282
Weight per cubic foot	79½	80 lb.
Space required for storage, per ton	42	42 c. ft.

Analyst—William Wallace.

Date of Analysis—August 6, 1886.

Notes.

DUMFRIESSHIRE.

SANQUHAR AND KIRKCONNEL COLLIERIES LIMITED,

Sanquhar.

Colliery—GATESIDE, Splint Seam, Gateside Pit.
Shipping Ports—Ayrshire ports.
Rail—Glasgow and South-Western, Sanquhar Station.
Canal— . . . . . .

Gateside (Sanquhar) Splint Gas Coal.

Class of Coal—Gas, Steam, and Manufacturing.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal is black to brownish black; possesses moderate to considerable lustre and brown streak; fracture partly slaty, laminated with brownish splint and bright bituminous coal; cross-fracture angular, coarse and partly resinoid, with deposits of ferric bisulphide and calcium carbonate; moderately cohesive and compact; under distillation it intumesces and agglomerates; colour of ash, pale brown; thickness of seam, 48 in., and of very uniform density, mean specific gravity being 1·229 (water 1·000); weight of 1 cubic foot, 76·83 lb.

		Per cent.
Volatile matters (containing 0·38 of sulphur) . .		35·87
Coke, consisting of—		
Carbon	55·84	
Sulphur	0·20	
Ash	3·33	
		59·37
Water expelled at 212 degs. Fahr.		4·76
		100·00

Gaseous products:—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	11,505 cubic feet
Gas from 1 cubic foot of the coal	394·83 cubic feet
Specific gravity of the gas	·508 (air 1·000)
Hydrocarbons absorbed by bromine . .	6·50 per cent.
Durability of 1 cubic foot by 5 in. jet flame	52 min. 10 sec.
Value of 1 cubic foot of gas in sperm . .	578·40 grains
Value of gas from 1 ton of coal in sperm . .	950·64 lb.
Illuminating power of gas in standard candles	24·10 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·00 per cent.
Carbonic acid (CO_2) in foul gas	2·75 per cent.
Carbonic oxide (CO) in foul gas	5·25 per cent.
Sulphur eliminated with volatile products	8·57 per cent.

Notes.

DUMFRIESSHIRE.

Gateside (Sanquhar) Splint Gas Coal—*cont.*

Liquid products—

Tar per ton of coal	15·45 gallons
Ammoniacal liquor, per ton of coal ..	23·13 gallons
Strength of ammoniacal liquor	2·50 degs. Twad.
Hygrometric water per ton of coal ..	10·66 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	7·60 per cent.

Solid products—

Coke per ton of coal	1,329·88 lb.
Carbon in the coke	94·40 per cent.
Ash in the coke	5·60 per cent.
Sulphur in coke per ton of coal	4·42 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	12·97 lb.

This is one of the best gas and coke producing splint coals that I have examined; of gas it yields an unusually large volume of high candle-power, and of first-class coke 11·87 cwt. per ton. The coal at same time contains a minimum percentage of sulphur, and a moderate amount of water. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 67·94.

Analyst—Geo. R. Hislop, F.C.S.

Date of Analysis—April 29, 1902.

Colliery—FAULDHEAD, ... Seam, Fauldhead Pit.

Sanquhar Washed Nut Coal.

Class of Coal—Steam, Manufacturing, House.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The nuts are of size to pass through a screen of from ½ in. to 1½ in. mesh and slightly dried; they possess considerable lustre and brownish-black streak; regular to intermittent fracture, with slight deposits of charcoal; cross-fracture, cubical and resinoid, with slight deposits of calcium carbonate; very clean and free from foreign matters; moderately cohesive; under distillation they intumesce and agglomerate; colour of ash, brown; mean specific gravity, 1·262 (water 1·000); weight of 1 cubic foot, 78·87 lb.

DUMFRIESSHIRE.

Notes

		Per cent.
Volatile matters (containing 0·65 of sulphur)		34·67
Coke, consisting of—		
Carbon..	54·05	
Sulphur	0·21	
Ash	3·47	
		57·73
Water expelled at 212 degs. Fahr.		7·60
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	11,150 cubic feet
Gas from 1 cubic foot of the coal	393·03 cubic feet
Specific gravity of the gas	·480 (air 1·000)
Hydrocarbons absorbed by bromine	5·25 per cent.
Durability of 1 cubic foot by 5 in. jet flame	46 min. 9 sec.
Value of 1 cubic foot of gas in sperm	470·40 grains
Value of gas from 1 ton of coal in sperm ..	749·28 lb.
Illuminating power of gas in standard candles (per London Argand)..	19·60 candles
Sulphuretted hydrogen (H_2S) in foul gas ..	1·75 per cent.
Carbonic acid (CO_2) in foul gas	3·00 per cent.
Carbonic oxide (CO) in foul gas	6·25 per cent.
Sulphur eliminated with volatile products ..	14·56 per cent.
Liquid products—	
Tar per ton of coal	15·32 gallons
Ammoniacal liquor per ton of coal ..	29·05 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal	17·02 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	10·85 per cent
Solid products—	
Coke per ton of coal	1,293·15 lb.
Carbon in the coke	94·00 per cent.
Ash in the coke	6·00 per cent.
Sulphur in coke, per ton of coal	4·70 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	12·91 lb.

The nuts yield a considerable volume of good gas, and at the same time afford 11·55 cwt. per ton of remarkably fine, porous and silvery coke, while the foul gas contains about the average amount of impurities. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas, this coal is equal to 54·37.

Analysts—Geo. R. Hislop.

Date of Analysis—March 28, 1902.

Notes.

DUMFRIESSHIRE.

Colliery—FAULDHEAD, ... Seam, ... Pit.

Shipping Port—Ayrshire Ports.

Rail—G. and S.W. Railway, Kirkconnel Station.

Canal— . . . . . .

Class of Coal—Coking, House, and Steam.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal possesses considerable lustre and brown streak. Fracture defined by deposits of charcoal; cross-fracture, cubical to angular. and largely resinoid, with deposits of calcic carbonate and traces of ferric bisulphide in the natural partings; moderately cohesive and porous; under distillation it intumesces and agglomerates; colour of ash, brown; mean specific gravity, 1·214 (water 1·000). Weight of 1 cubic foot, 75·88 lb.

		Per cent.
Volatile matters (containing 0·54 of sulphur)		34·82
Coke, consisting of—		
Carbon	54·28	
Sulphur	0·16	
Ash	2·51	
		56·95
Water expelled 212 degs. Fahr.		8·23
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	10,730 cubic feet
Gas from 1 cubic foot of the coal	363·47 cubic feet
Specific gravity of the gas	·490
Hydrocarbons absorbed by bromine ..	5·25 per cent.
Durability of 1 cubic foot by 5-in. jet flame	46 min. 9 sec.
Value of 1 cubic foot of gas in sperm ..	509·04 grains
Value of gas from 1 ton of coal in sperm ..	780·28 lb.
Illuminating power of gas in standard candles (per London Argand)	21·21 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·50 per cent.
Carbonic acid (CO_2) in foul gas	3·00 per cent.
Carbonic oxide (CO) in foul gas	6·50 per cent.
Sulphur eliminated with volatile products	12·10 lb.

Notes.

DUMFRIESSHIRE.

Liquid products—	
Tar per ton of coal	15·60 gallons
Ammoniacal liquor, per ton of coal ..	32·45 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal	18·43 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	11·60 per cent.
Solid products—	
Coke per ton of coal	1,275·68 lb.
Carbon in the coke	95·60 per cent.
Ash in the coke	4·40 per cent.
Sulphur in coke per ton of coal	3·58 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	13·13 lb.

While yielding a good volume of gas of relatively high candle-power, this coal claims special recommendation on account of the high-class coke it affords; the impurities in the foul gas are, at the same time, of the average amount. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas), this coal is equal to 57·54.

Analyst—Geo. R. Hislop, F.C.S., M.S.C. Ind., F.R.S.S.A.

Date of Analysis—June 10, 1905.

Notes

EDINBURGH.

ARNISTON COAL COMPANY LIMITED

Gorebridge, Edinburgh.

Colliery—ARNISTON, ... Seam, Emily and Gore Pits.
Shipping Ports—Leith and Granton.
Rail— . . . . . Gorebridge Station.
Canal—None.

Arniston Cannel Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal is brownish black, possesses considerable and strong brown streak; fracture, rather irregular and undulating, with impressions of stigmaria; cross-fracture, semi-conchoidal to angular, with deposits of ferric-bisulphide and calcium carbonate; very cohesive and compact; on the fire it partially intumesces and agglomerates; colour of ash, pale brown; thickness of seam, 8 in.; mean specific gravity, 1·192 (water 1·000); weight of one cubic foot, 74·50 lb.

		Per cent.
Volatile matters (containing 0·69 of sulphur)		52·88
Coke, consisting of—		
Carbon	42·48	
Sulphur	0·22	
Ash	3·10	
		45·80
Water expelled at 212 degs. Fahr... ..		1·32
		100·00

Gaseous products –	
Gas per ton of coal at 60 degs. Fahr., and 30 in bar.	14,135 cubic feet
Gas from 1 cubic foot of the coal	470·11 cubic feet
Specific gravity of the gas	·696 (air 1·000)
Hydrocarbons absorbed by bromine ..	15·25 per cent.
Durability of 1 cubic foot by 5 in. jet flame	70 min. 48 sec.
Value of 1 cubic foot of gas in sperm ..	896·64 grains
Value of gas from 1 ton of coal in sperm..	1,810·57 lb.
Illuminating power of gas in standard candles	37·36 candles
Sulphuretted hydrogen (H_2S) in foul gas..	2·00 per cent.
Carbonic acid (CO_2) in foul gas	2·25 per cent
Carbonic oxide (CO) in foul gas	7·50 per cent.
Sulphur eliminated with volatile products	15·46 lb.

Notes.

EDINBURGH.

Liquid products—	
Tar per ton of coal	28·85 gallons
Ammoniacal liquor per ton of coal ..	5·25 gallons
Strength of ammoniacal liquor	3·60 degs. Twaddell
Hygrometric water per ton of coal ..	2·95 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	1·50 per cent.
Solid products—	
Coke per ton of coal	1,025·92 lb.
Carbon in the coke	93·24 per cent.
Ash in the coke	6·76 per cent.
Sulphur in coke, per ton of coal . ..	4·92 lb.
Heating power of 1 lb. of coke (water from boiling point into steam).. ..	12·81 lb.

This is an exceptionally rich cannel coal, yielding as it does a sperm value of illuminating matter equal to 1,810½ lb. per ton, and at same time affords 9·16 cwt. of excellent coke per ton. The coal, moreover, is easily distilled at a good heat, and the foul gas contains about the average total impurities. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas), this coal is equal to 124·13.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A., F.I.Inst.
Date of Analysis—June 20, 1896.

Arniston Steam Coal.

Class of Coal—Steam.

	Composition per cent.	Composition per cent. exclusive of sulphur, ash, and water.
Carbon	73·13 ..	84·66
Hydrogen	4·96 ..	5·74
Oxygen	6·93 ..	8·02
Nitrogen	1·36 ..	1·58
Sulphur	1·08	—
Ash	2·72 ..	—
Water	9·82 ..	—
	100·00	100 00

Specific gravity, 1·265, water at 60 Fahr. being 1·000; colour of ash, pinkish; nature of coal, caking; coke, 63·60 per cent.; small bulk, dull in appearance, but fairly hard and coherent; total heat units (Favre

Notes.

EDINBURGH.

Arniston Steam Coal—*cont.*

and Silverman), 7,269; calorific power (Thompson), 7,029 calories; evaporative power (determined by Thompson's calorimeter), 13·09 lb. of water per pound of coal.

This coal is of a bituminous nature. The amount of ash is fairly low and satisfactory, and the proportion of sulphur moderate.

Analyst—Thomas Hughes, F.I.C., F.C.S.

Date of Analysis—June 4, 1902.

WM. BLACK,

Penicuik.

Colliery—PENICUIK, ... Seam, Mauricewood Pit.
Shipping Port—Leith.
Rail— . . . . . Station.
Canal— . . . . .

Corbie Jewel House Coal.

Class of Coal—House.

The coal is black, possesses considerable lustre and brown to brownish-black streak; fracture intermittent and partly laminated; cross-fracture angular to cubical and largely resinoid, with deposits of calcium carbonate and slight deposits of ferric bisulphide; moderately cohesive but porous. On the fire it intumesces slightly. Colour of ash, strong brown. Thickness of seam, 51 in., and of very uniform density. Mean specific gravity, 1·216 (water, 1·000); weight of 1 cubic foot, 76·0 lb.

	Per cent.	Lb. per ton.
Volatile matters	33·59	752·416
Fixed carbon	53·38	1,195·712
Ash	2·94	65·856
Sulphur	0·59	13·216
Moisture	9·50	212·800
	100·00	2,240·000

The calorific power of the coal (as determined by Thomson's calorimeter), 1 lb. of the coal by perfect combustion evolves sufficient heat to convert 13·5 lb. of water from 212 degs. Fahr. into steam; 1 lb. will therefore raise 13,041 lb. of water 1 deg. Fahr. in temperature.

Analyst—Geo. R. Hislop, F.C.S., &c.
Date of Analysis—April 17, 1902.

EDINBURGH.

Notes.

Corbie Splint Coal.

Class of Coal—House and Gas.

A sample of this coal, representing the entire product of the seam, was examined and gave the following results :—

The coal is black to brown and brownish-black with moderate lustre ; fracture slaty and coarse ; cross-fracture angular and in part semi-conchoidal, with slight deposits of calcium carbonate and ferric bisulphide ; very cohesive, but rather porous. Under distillation it partly and slightly intumesces. Colour of ash, pale brown ; thickness of seam, 29 in. ; mean specific gravity, 1·258 (water, 1·000) ; weight of 1 cubic foot, 78·62 lb.

		Per cent.
Volatile matters (containing 0·56 of sulphur)		38·34
Coke, consisting of—		
Carbon	48·39	
Sulphur	0·17	
Ash	4·00	
		52·56
Water expelled at 212 degs. Fahr. ..		9·10
		100·00

Gaseous products :—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	10,750 cubic feet
Gas from 1 cubic foot of the coal .. .	377·30 cubic feet
Specific gravity of the gas	·521 (air 1·000)
Hydrocarbons absorbed by bromine ..	6·75 per cent.
Durability of 1 cubic foot by 5 in. jet flame	52 mins. 20 secs.
Value of 1 cubic foot of gas in sperm ..	562·80 grains
Value of gas from 1 ton of gas in sperm ..	864·25 lb.
Illuminating power of gas in standard candles (per Union jet)	23·45 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·50 per cent.
Carbonic acid (CO_2) in foul gas	4·50 per cent.
Carbonic oxide (CO) in foul gas	7·75 per cent.
Sulphur eliminated with volatile products	12·54 lb.
Liquid products—	
Tar per ton of coal	17·50 gallons
Ammoniacal liquor per ton of coal ..	34·42 gallons
Strength of ammoniacal liquor	2·25 degs. Twadd.
Hygrometric water per ton of coal ..	20·38 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	12·24 per cent.

Notes.

EDINBURGH.

Corbie Splint Coal—*cont.*

Solid products—

Coke per ton of coal	1,177·34 lb.
Carbon in the coke	92·40 per cent.
Ash in the coke	7·60 per cent.
Sulphur in coke per ton of coal	3·81 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	12·69 lb.

This is an excellent splint coal, and as such yields a large amount of illuminating matter per ton, and at same time affords 10·51 cwt. per ton of excellent coke. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm value per ton and having regard also to the value of the secondary products and the cost of the purification of the gas) this coal is equal to 57·75.

Analyst—Geo. R. Hislop, F.C.S., &c.

Date of Analysis—March 29, 1902.

LOTHIAN COAL COMPANY LIMITED,

Rosewell.

Colliery—WHITEHILL, Splint Coal Seam, Whitehill Pit.

Shipping Port—Leith.

Rail—North British, Hawthornden Station.

Canal—None.

Whitehill Splint Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

		Per cent.
Volatile matters (containing 0·23 sulphur)		38·78
Coke—		
Fixed carbon	48·34	
Sulphur	0·44	
Ash	2·16	
		50·94
Water expelled at 212 degs. Fahr... ..		10·28
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	9,992 cubic feet
Gas from 1 cubic foot of coal	365·2 cubic feet
Hydrocarbons absorbed by bromine ..	4·8 per cent.
Illuminating power in standard sperm candles	15·99 candles
Durability of 1 cubic foot by 5 in. jet flame	38 min. 10 sec.
Equivalent of 1 cubic foot in sperm ..	383·7 grains
Equivalent of 1 ton of coal in sperm ..	547·7 lb.
Sulphur in gas from 1 ton of coal	5·15 lb

Notes.

EDINBURGH.

Liquid products—	
Tar per ton of coal	18 gallons
Ammoniacal liquor (including liquor from washers)	44·5 gallons
Strength of liquor by acid test	4·75 oz.
Solid products—	
Coke per ton of coal	1,312 lb.
	Per cent.
Carbon in coke	94·98
Sulphur	0·86
Ash	4·16
	100·00
Specific gravity of the coal	1·310
Weight of 1 cubic foot	81·875 lb.

Analyst—Robert Mitchell.

Date of Analysis—April 3, 1889.

Colliery—WHITEHILL, Jewel Coal Seam, Whitehill Pit.

Whitehill Jewel Coal.

Class of Coal—House.

		Per cent.
Volatile matters (containing 0·26 sulphur)		27·77
Coke—		
Fixed carbon	55·60	
Sulphur	0·28	
Ash	3·94	
		59·82
Water expelled at 212 degs. Fahr. ..		12·41
		100·00
Solid products—		
Coke per ton of coal		1,339 lb.
		Per cent.
Carbon in coke		92·94
Sulphur		0·46
Ash		6·60
		100·00

Analyst—Stevenson MacAdam, F.R.S.E., Ph.D., etc.

Date of Analysis—November 3, 1897.

Notes.

EDINBURGH.

Colliery—POLTON, Splint Coal Seam, No. 2 Pit.

Polton Splint Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

		Per cent.
Volatile matters (containing 0·24 sulphur)		32·21
Coke—		
Fixed carbon	48·95	
Sulphur	0·62	
Ash	4·56	
		54·13
Water expelled at 212 degs. Fahr. ..		13·66
		100·00
Solid products—		
Coke per ton of coal		1,212 lb.
		Per cent.
Carbon in coke		90·43
Sulphur		1·15
Ash		8·42
		100·00
Yield of gas per ton		10,388 cubic feet
Illuminating power of gas		13·95 candles

Analyst—Stevenson MacAdam, Ph.D., etc.

Date of Analysis—November 3, 1897.

LOTHIAN COAL COMPANY LIMITED,

Newtongrange, Midlothian.

Colliery—NEWBATTLE, Splint Seam, Newbattle Pit.

Shipping Ports—Leith, Granton.

Rail—North British, Lady Victoria Pit Siding, Hardengreen Station.

Canal—None

Newbattle Splint Coal.

Class of Coal—Gas.

		Per cent.
Volatile matters (containing 0·03 sulphur)		30·07
Coke—		
Fixed carbon	57·66	
Sulphur	0·39	
Ash	1·59	
		59·64
Water expelled at 212 degs. Fahr... ..		10·29
		100·00

Notes.

EDINBURGH.

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	10,520 cubic feet
Gas from 1 cubic foot of coal	368·6 cubic feet
Specific gravity of the gas	·536 (air = 1·000)
Hydrocarbons absorbed by bromine ..	4 per cent.
Illuminating power in standard sperm candles	15·45 candles
Durability of 1 cubic foot by 5 in. jet flame	38 mins.
Equivalent of 1 cubic foot in sperm ..	370·8 grains
Equivalent of 1 ton of coal in sperm ..	557·2 lb.
Sulphur in gas from 1 ton of coal	0·67 lb.
Liquid products—	
Tar per ton of coal	14 gallons
Ammoniacal liquor (including liquor from washers)	43·5 gallons
Strength of liquor by acid test	5 oz.
Solid products—	
Coke per ton of coal	1,360 lb.
	Per cent.
Carbon in coke	96·67
Ash	2·68
Sulphur	0·65
	100·00
Specific gravity of the coal	1·257
Weight of 1 cubic foot	78½ lb.

Analyst—Robert Mitchell.

Date of Analysis—December 17, 1889.

Colliery—NEWBATTLE, Jewel Seam, Newbattle Pits.

Newbattle Jewel Coal.

Class of Coal—House.

	Per cent.
Volatile combustible matter ..	39·13
Fixed carbon	55·72
Ash	2·56
Sulphur	0·62
Moisture	1·97
	100·00
Coke	58·59

Notes.

EDINBURGH.

Newbattle Jewel Coal—*cont.*

The coal is of first-class quality as a household coal. It is hard and compact in quality, and is not liable to break down into dross. When kindled, it burns freely, evolving much combustible gas, and forms an excellent cinder or coke, which continues to consume away at a bright cherry heat, leaving only a slight amount of ash. This coal can be recommended for use where a first-class, clean-burning house coal is required.

Analyst—Stevenson MacAdam, F.R.S.E., etc.

Date of Analysis—September 22, 1887.

Colliery—NEWBATTLE, ... Seam, Newbattle Pits.

Newbattle Steam Coal.

Class of Coal—Steam.

Mean specific gravity of the coal (water = 1·000) . .	1·322
Weight of 1 cubic foot of the coal . .	82·38 lb.
Proximate analysis.—When heated the coal yields :—	Per cent.
Volatile combustible matter	31·32
Fixed carbon	55·02
Ash	3·43
Sulphur	0·36
Moisture	9·87
	100·00
Coke	58·56 per cent.
Weight of coke per ton of the coal	1,311¾ lb. (11¾ cwt.)
Weight of ash per ton of the coal . .	76$\frac{8}{10}$ lb.
Weight of sulphur per ton of the coal	8 lb.
Examination of the coke—	Per cent.
Carbon	93·82
Sulphur	0·11
Oxygen, &c.	0·22
Ash	5·85
	100·00
Weight of ash per ton of coke	131 lb. (1$\frac{1}{10}$ cwt.)
Weight of sulphur per ton of coke	2·46 lb. (2½ lb.)

Notes.

EDINBURGH.

Ultimate analysis.—Constituents of the coal--	Per cent.
Carbon	74·25
Hydrogen	5·54
Nitrogen	0·78
Oxygen, &c.	5·77
Sulphur	0·36
Ash	3·43
Moisture	9·87
	100·00

Calorific or heat-producing power.—1 lb. of the coal during perfect combustion evolves heat sufficient to raise 12,915 lb. of water 1 degree (Fahr.) in temperature equal to—

71·75 lb. of water from 32 to 212 degs. F.,
86·10 lb. of water from 62 to 212 degs. F.,
11·58 lb. of water from 62 to 212 degs. F., and thence into steam, or to
13·38 lb. of water from 212 degs. F. into steam.

The above results show the Newbattle steam coal to be of high-class composition for steam-raising purposes. The sulphur is low in amount, and so distributed throughout the coal that it should be practically impossible for heating to take place; and the coal will be found a safe one to ship for long sea voyages. The coal does not readily break down or crumble, and the coke obtained, when heat is applied in closed vessels, is of high-class heating quality and low in ash. The ash contains only a trace of iron, and is not liable to clinker. The heating power is sufficient to raise 12,915 lb. of water 1 degree in temperature, or to raise 11½ lb. of water from 62 degs. Fahr. to the boiling point and thence into steam, or of 13⅜ lb. of water from the boiling point into steam.

The coal is of high-class quality for steam-raising, and it may be shipped with safety.

Analyst—W. Ivison MacAdam, F.R.S.E., F.I.C., F.C.S., etc.
Date of Analysis—April 28, 1894.

Colliery—NEWBATTLE, Cannel Seam, Newbattle Pits.

Newbattle Cannel Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal inclines to brownish black, possesses considerable lustre, and yellowish-brown streak; fracture generally inclines to slaty, but in part irregular to curly, with impressions of stigmaria; cross-fracture

Notes.

EDINBURGH.

Newbattle Cannel Coal—*cont.*

inclines to conchoidal, but partly angular to curly, with deposits of ferric bisulphide and calcium carbonate in the natural partings. Very cohesive and compact; on the fire it partly and very slightly intumesces, but does not agglomerate; colour of ash, brownish white; thickness of seam, 8 in.; mean specific gravity, 1·175 (water 1·000); weight of 1 cubic foot, 73·43 lb.

		Per cent.
Volatile matters (containing 0·56 of sulphur)		50·23
Coke, consisting of		
Carbon	44·06	
Sulphur	0·24	
Ash	4·33	
		48·63
Water expelled at 212 degs. Fahr... ..		1·14
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar...	13,720 cubic feet
Gas from 1 cubic foot of the coal	449·76 cubic feet
Specific gravity of the gas	·668 (air 1·000)
Hydrocarbons absorbed by bromine	14·66 per cent.
Durability of 1 cubic foot by 5 in. jet flame ..	68 min. 16 sec.
Value of 1 cubic foot of gas in sperm	845·76 grains
Value of gas from 1 ton of coal in sperm ..	1,708·03 lb.
Illuminating power of gas in standard candles	35·24 candles
Sulphuretted hydrogen (H_2S) in foul gas ..	1·25 per cent.
Carbonic acid (CO_2) in foul gas..	3·00 per cent.
Carbonic oxide (CO) in foul gas	8·00 per cent.
Sulphur eliminated with volatile products ..	12·54 lb.
Liquid products—	
Tar per ton of coal	28·80 gallons
Ammoniacal liquor per ton of coal	4·38 gallons
Strength of ammoniacal liquor	3·60 degs. Twadd.
Hygrometric water, per ton of coal	2·55 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	1·58 per cent.
Solid products—	
Coke per ton of coal	1,089·31 lb.
Carbon in the coke	91·10 per cent.
Ash in the coke	8·90 per cent.
Sulphur in the coke, per ton of coal	5·38 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	12·51 lb.

Notes.

EDINBURGH.

This is a very rich cannel coal ; it is easily distilled and yields a large volume of 35·24-candle gas, and affords 9·72 cwt. of good coke per ton. The foul gas at same time contains a moderate percentage of impurities. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 112·73.

Analyst—Geo. R. Hislop, F.C.S.. F.I.Inst., F.R.S.S.A.

Date of Analysis—September 3, 1895.

Colliery—NEWBATTLE, Parrot Bottoms Seam, Newbattle Pits.

Newbattle Parrot Bottoms Coal.

Class of Coal—Gas.

A sample of this coal gave on examination the following results :—

Mean specific gravity		1·265 (water 1·000)	
Weight of 1 cubic foot		79·06 lb.	
		Per cent.	
Volatile matters (containing 0·51 of sulphur)..		36·55	
Coke consisting of—			
Carbon	52·86		
Sulphur	0·32		
Ash	3·35		
		56·53	
Water expelled at 212 degs. Fahr.		6·92	
		100·00	

Gaseous products—

Gas per ton of coal at 60 degs. F. and 30 in. bar	10,830 cubic feet
Gas from 1 cubic foot of coal	382·24 cubic feet
Hydrocarbons absorbed by bromine	7·6 per cent.
Durability of 1 cubic foot of gas in 5 in. jet flame	46 min. 10 sec.
Illuminating power of gas in standard candles	23·25 candles
Value of 1 cubic foot of gas in sperm	567·79 grains
Value of gas from 1 ton of coal in sperm ..	863·3 lb.
Sulphur eliminated with volatile products ..	11·42 lb.

Liquid products :—

Tar per ton of coal..	12·6 gallons
Ammoniacal liquor per ton of coal	16·4 gallons
Strength of ammoniacal liquor	3 degs. Twadd.
Hygrometric water per ton of coal	15·50 gallons

Notes.

EDINBURGH.

Newbattle Parrot Bottoms Coal—*cont.*

Solid products—

Coke per ton of coal	1,266 lb.
Carbon in the coke	94·02 per cent.
Ash in the coke	5·98 per cent.
Sulphur in coke per ton of coal	7·16 lb.

The above results prove these Parrot bottoms to be very suitable for gas-making purposes, yielding 10,830 cubic feet of 23·24-candle gas. The coke is also of very good quality.

Analyst—Jas. D. Smith.

Date of Analysis—March 30, 1903.

A. G. MOORE AND CO.,

142, St. Vincent Street, Glasgow.

Colliery—DALKEITH, Great Seam, Smeatonshaw Pit.

Shipping Port—Leith.

Rail—North British, Smeaton Station.

Canal—None.

Dalkeith Splint Coal.

Class of Coal—Gas.

The coal possesses moderate lustre and brownish-black streak; fracture somewhat regular and partly splinty, with slight deposits of charcoal; cross-fracture angular to cubical and partly resinoid, with deposits of calcium carbonate and ferric bisulphide; rather cohesive, but porous; under distillation it agglomerates and swells, the coke possessing a silvery lustre; ash flocculent and pale brown in colour; specific gravity, 1·245 (water 1·000); weight of 1 cubic foot, 77·81 lb.

		Per cent.
Volatile matters (containing 0·56 sulphur)		36·38
Coke, consisting of—		
Carbon	50·30	
Sulphur	0·21	
Ash	3·69	
		54·20
Water expelled at 212 degs. Fahr.		9·42
		100·00

EDINBURGH.

Notes.

Gaseous products :—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	10,830 cubic feet
Gas from 1 cubic foot of the coal	367·27 cubic feet
Specific gravity of the gas	·498 (air = 1·000)
Hydrocarbons absorbed by bromine ..	5·75 per cent.
Durability of 1 cubic foot by 5 in. jet flame	44 min. 45 sec.
Value of 1 cubic foot of gas in sperm ..	487·20 grains
Value of gas from 1 ton of coal, in sperm	769·19 lb.
Illuminating power of gas in standard candles (per London Argand)	20·30 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·50 per cent.
Carbonic acid (CO_2) in foul gas	3·75 per cent.
Carbon oxide (CO) in foul gas	5·75 per cent.
Sulphur eliminated with volatile products	12·54 lb.
Liquid products :—	
Tar per ton of coal	15·25 gallons
Ammoniacal liquor per ton of coal ..	36·70 gallons
Strength of ammoniacal liquor	2·50 degs. Twaddell
Hygrometric water per ton of coal ..	21·10 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	12·16 per cent.
Solid products :—	
Coke per ton of coal	1·214·08 lb.
Carbon in the coke	93·20 per cent.
Ash in the coke	6·80 per cent.
Sulphur in coke per ton of coal	4·70 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	12·83 lb.

While yielding a good average volume of 20·3 candle gas, this coal affords 10·84 cwt. of excellent coke per ton. The coal contains about the average percentage of impurities, but over the average amount of water. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 53·19.

Analyst—Geo. R. Hislop, F.C.S., M.S.C.Ind., F.R.S.S.A.

Date of Analysis—February 2, 1906.

Notes.

EDINBURGH.

NIDDRIE AND BENHAR COAL COMPANY LIMITED,

29, Hanover Street, Edinburgh.

Colliery— . . . . . Great Seam, ... Pit.
Shipping Port— . . . . . .
Rail— . . . . . Station.
Canal— . . . . . .

Niddrie Great Seam or No. 1 Cannel Coal.

Class of Coal—Gas.

		Per cent.
Chemical analysis—		
Volatile matters (containing 0·43 of sulphur)		48·02
Coke, consisting of—		
Carbon	45·30	
Sulphur	0·27	
Ash	2·41	
		47·98
Water expelled at 212 degs. Fahr... ..		4·00
		100·00

Gaseous products—	
Gas per ton of coal, at 60 degs. Fahr., and 30 in. bar.	12,330 cubic feet
Gas from 1 cubic foot of the coal	425·88 cubic feet
Specific gravity of the gas	·568 (air 1·000)
Hydrocarbons absorbed by bromine ..	13·50 per cent.
Durability of 1 cubic foot by 5 in. jet flame	62 min. 30 sec.
Value of 1 cubic foot of gas in sperm ..	778·80 grains
Value of gas from 1 ton of coal in sperm..	1,371·80 lb.
Illuminating power of gas in std. candles	32·45 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·33 per cent.
Carbonic acid (CO_2) in foul gas	3·25 per cent.
Carbonic oxide (CO) in foul gas	4·50 per cent.
Sulphur eliminated with volatile products	9·64 lb.
Liquid products—	
Tar per ton of coal	26·50 gallons
Ammoniacal liquor per ton of coal ..	16·80 gallons
Strength of ammoniacal liquor	3·50 degs. Twadd.
Hygrometric water per ton of coal ..	8·96 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	5·46 per cent.

EDINBURGH.

Notes.

Solid products—

Coke per ton of coal	1,074·75 lb.
Carbon in the coke	95·20 per cent.
Ash in the coke	4·80 per cent.
Sulphur in coke per ton of coal	6·04 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	13·07 lb.

This is a cannel coal of the first class, as, in addition to yielding a large volume of rich gas, it affords fully 9½ cwt. of first-class coke, and contains a moderate amount of both water and sulphur.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.

Date of Analysis—April 26, 1887.

SHOTTS IRON COMPANY LIMITED,

130, George Street, Edinburgh.

Colliery—LOANHEAD, Great Seam, ... Pit.

Shipping Ports—Leith, Granton.

Rail—North British, Loanhead Station.

Canal—None.

Loanhead Steam Coal.

Class of Coal—Steam.

Chemical analysis—		Per cent.
Volatile matters (containing 0·46 of sulphur)		36·74
Coke, consisting of—		
Carbon	51·02	
Sulphur	0·27	
Ash	4·22	
		55·51
Water expelled at 212 degs. Fahr. ..		7·75
		100·00

Analyst—Geo. R. Hislop, F.C.S., &c.

Date of Analysis—April 9, 1891.

Notes.

FIFESHIRE.

BOWHILL COAL COMPANY LIMITED,

Cardenden.

Colliery—BOWHILL, Five-feet Seam, Bowhill Pit.

Shipping Ports—Burntisland and Methil.

Rail—North British, Cardenden Station.

Canal— . . . . . .

Bowhill Navigation Steam Coal.

Class of Coal—Steam.

	Per cent.	Per cent.
Carbon	79·10	84·07
Hydrogen	5·11	5·43
Oxygen	8·32	8·84
Nitrogen	1·56	1·66
Sulphur	0·85	—
Ash	1·15	—
Water	3·91	—
	100·00	100·00

	Per cent.
Fixed carbon	61·95
Volatile matters (other than sulphur and water)	32·14
Ash, sulphur, and water	5·91
	100·00

Specific gravity, 1·288, water at 60 degs. Fahr. being 1·000.
Colour of ash, yellowish ; nature of coal, bituminous.
Coke, 63·1 per cent., hard and compact, and well fused.
Total heat units (Favre and Silbermann) 7,773.
Calorific power (Thomson), 7,443 calories.
Evaporative power (Thomson), 13·86 lb. of water per pound of coal.

This coal is of a bituminous nature. The amounts of ash and sulphur are very favourable, and generally speaking, it is a good coal of its class, and, considering its bituminous character, the coal will, I think, give excellent results for steam purposes, and it is also of a hard nature, which makes it well suited for transit.

Analyst—Thomas Hughes.

Date of Analysis—November 19, 1904.

FIFESHIRE.

Notes

DUNDONALD COLLIERIES,

Cardenden.

Colliery—DUNDONALD, Mynheer Seam, No. 1 Pit.
Shipping Ports—Methil, Burntisland.
Rail—North British, Cardenden Station.
Canal—None

Dundonald Mynheer Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

A sample of this coal, representing the entire product of the seam, gave, on examination, the following results:—

The coal is black, possesses moderate to considerable lustre and brown streak. Fracture regular to irregular and partly laminated with deposits of charcoal, a 3 in. band semi-cannel. Cross-fracture angular and resinoid, with considerable deposits of calcium carbonate and ferric bisulphide; moderately cohesive, but porous; under distillation it intumesces and agglomerates. Colour of ash, brown; mean specific gravity, 1·223 (water 1·000); weight of 1 cubic foot, 76·43 lb.

		Per cent.
Volatile matters (containing 0·62 of sulphur)		37·96
Coke, consisting of—		
Carbon	49·17	
Sulphur	0·23	
Ash	2·72	
		52·12
Water expelled at 212 degs. Fahr. ..		9·92
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar...	11,610 cubic feet
Gas from 1 cubic foot of the coal	397·03 cubic feet
Specific gravity of the gas	·487 (air 1·000)
Hydrocarbons absorbed by bromine	5·50 per cent.
Durability of 1 cubic foot by 5 in. jet flame ..	42 min. 28 sec.
Value of 1 cubic foot of gas in sperm	460·80 grains
Value of gas from 1 ton of coal in sperm ..	764·26 lb.
Illuminating power of gas in standard candles (London Argand)	19·20 candles
Sulphuretted hydrogen (H_2S) in foul gas ..	1·75 per cent.
Carbonic acid (CO_2) in foul gas..	3·25 per cent.
Carbonic oxide (CO) in foul gas	6·00 per cent.
Sulphur eliminated with volatile products ..	16·27 lb.

Notes.

FIFESHIRE.

Dundonald Mynheer Coal—*cont.*

Liquid products—	
Tar per ton of coal	14·30 gallons
Ammoniacal liquor per ton of coal	39·50 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal	22·22 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	12·86 per cent.
Solid products—	
Coke per ton of coal	1,177·48 lb.
Carbon in the coke	94·80 per cent.
Ash in the coke	5·20 per cent.
Sulphur in the coke per ton of coal	5·01 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	13·02 lb.

This is a good coal for the production of gas and coke, and as such yields a large volume of 19·2-candle gas, and at same time affords 10½ cwt. per ton of first-class coke. The aqueous absorbent capacity of the coal, however, exceeds the average. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas) this coal is equal to 56·50.

Analyst—Geo. R. Hislop, F.C.S., &c.

Date of Analysis—March 28, 1903.

THE FIFE COAL COMPANY LIMITED,

Leven.

Colliery—KELTY, Dunfermline Splint and Five-feet Seam, Aitken Pit.

Shipping Ports—Burntisland, Methil, Leith, Dundee, Glasgow.

Rail—North British, Kelty Station.

Canal—None.

Aitken Navigation Steam Coal.

Class of Coal—Steam.

	(Dry coal.) Per cent.
Carbon	86·15
Hydrogen	4·87
Oxygen	5·00
Nitrogen	1·34
Sulphur	0·70
Ash	1·94
	100·00

Notes.

FIFESHIRE.

Fixed carbon	70·61
Volatile matters, other than sulphur and water	24·47
Sulphur, ash, and water	4·92
	100·00

Specific gravity, 1·258, water at 60 degs. Fahr. being 1·000. Colour of ash, buff. Nature of coal, caking. Total heat units (Favre and Silbermann), 8,214. Calorific power (Thompson), 7,649 calories.

This coal resembles some of the more bituminous South Wales coal, but more closely, perhaps, some of the more valuable Monmouthshire coals. Like them, it has a high percentage of carbon and hydrogen, with a moderate but higher percentage of oxygen than is found in the drier South Wales coals. The sulphur is low and favourable.

This coal is of excellent quality, and as a house coal, or for furnace or steam purposes, where a rather bituminous coal free from excess of ash or sulphur is required, it must be very valuable.

Analyst—Thos. Hughes.

Date of Analysis—June 9, 1897.

WALTER HERD AND SONS,

Kirkcaldy.

Colliery—DUNNIKIER, Five-feet Seam, Panny Pits.

Shipping Ports—Methil, Burntisland.

Rail—North British Railway, Sinclairton Station.

Canal—None.

Dunnikier Coking Gas Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

The coal is black, possesses high lustre and brown to brownish-black streak, fracture irregular with deposits of charcoal ; cross-fracture angular to cubical and resinoid with numerous natural partings containing their deposits of calcium carbonate and ferric bisulphide ; friable but compact or non-porous. Under distillation it intumesces and agglomerates. Colour of ash, brown. Mean specific gravity, 1·251 (water 1·000). Weight of 1 cubic foot, 78·20 lb.

		Per cent.
Volatile matters (containing 0·35 of sulphur)		32·11
Coke, consisting of—		
Carbon	59·28	
Sulphur	0·19	
Ash	4·90	
		64·37
Water expelled at 212 degs. Fahr.		3·52
		100·00

Notes.

FIFESHIRE.

Dunnikier Coking Gas Coal—*cont.*

Gaseous products—

Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	12,180 cubic feet
Gas from 1 cubic foot of the coal	425·21 cubic feet
Specific gravity of the gas	·482 (air 1·000)
Hydrocarbons absorbed by bromine ..	5·25 per cent.
Durability of 1 cubic foot by 5 in. jet flame	45 min. 8 sec.
Value of 1 cubic foot of gas in sperm ..	481·44 grains
Value of gas from 1 ton of coal in sperm..	837·71 lb.
Illuminating power of gas in standard candles (per London Argand) ..	20·06 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·25 per cent.
Carbonic acid (CO_2) in foul gas	2·00 per cent.
Carbonic oxide (CO) in foul gas	6·25 per cent.
Sulphur eliminated with volatile products	7·96 lb.

Liquid products—

Tar per ton of coal	14·10 gallons
Ammoniacal liquor per ton of coal ..	13·24 gallons
Strength of ammoniacal liquor	3·00 degs. Twadd.
Hygrometric water per ton of coal ..	7·88 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	5·86 per cent.

Solid products—

Coke per ton of coal	1,441·88 lb.
Carbon in the coke	92·40 per cent.
Ash in the coke	7·60 per cent.
Sulphur in coke per ton of coal	4·13 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	12·69 lb.

This is a remarkably good gas and coking coal, yielding as it does a very large volume of 20-candle gas, and at same time affording 12·87 cwt. of first-class coke per ton. The foul gas also contains a minimum percentage of impurities. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the bases of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 60·62.

Analyst—Geo. R. Hislop, F.C.S., M.S.C.Ind., F.R.S.S.A.

Date of Analysis—March 13, 1903.

Notes.

FIFESHIRE.

Dunnikier Navigation Steam Coal

Class of Coal—Steam.

	Per cent.	Per cent., exclusive of Sulphur, Ash, and Water.
Carbon	75·78	85·19
Hydrogen	4·96	5·57
Oxygen	6·87	7·72
Nitrogen	1·35	1·52
Sulphur	0·91	
Ash	5·38	
Water	4·75	
	100·00	100·00

	Per cent.
Fixed carbon	63·12
Volatile matters (other than sulphur and water)	25·84
Ash, sulphur, and water	11·04
	100·00

Specific gravity, 1·293, water at 60 degs. Fahr. being 1·000.
Colour of ash, light brownish; nature of coal, caking.
Coke, 68·50 per cent., small bulk, dull in appearance, but hard and coherent.
Total heat units (Favre and Silvermann), 7,510.
Calorific power (Thompson), 7,233 calories.
Evaporative power in pounds of water per pound of coal (as determined by Thompson's calorimeter), 13·47 lb.

The coal is of a bituminous character. The proportion of sulphur is fairly favourable, but the ash is a little high. Generally speaking, however, it is a very useful coal of its class. Owing to the nature and general character of the coal, the calorific power, as determined by Thompson's calorimeter, is about 1 lb. of water per pound of coal, less than that usually given by the best semi-bituminous steam coals.

Analyst—Thomas Hughes, F.I.C., F.C.S.
Date of Analysis—April 10, 1902.

Notes.

FIFESHIRE.

Colliery—DUNNIKIER, Parrot Seam, Panny and Begg Pits.

Dunnikier Cannel Coal.

Class of Coal—Gas.

		Per cent.
Volatile matters—		
Gas, tar, &c.	32·69	
Sulphur	·08	
Water	4·73	
		37·50
Coke—		
Fixed carbon	57·15	
Sulphur	·05	
Ash	5·30	
		62·50
		100·00

Coke (dry) per ton of coal, 1,400 lb., equal to 12 cwt. 2 qrs.

	Per cent.
Analysis of the coke (dry)—	
Carbonaceous, or combustible matter	91·44
Sulphur	·08
Ash	8·48
	100·00

Practical results—

Gas per ton of coal at 60 degs. Fahr. and 30 in. bar. pressure..	10,550 cubic feet
Illuminating power, by union jet, consuming 5 cubic feet per hour at 5 in. water pressure	23·16 candles
Value of 1 cubic foot in grains of sperm..	556
Value of 1 ton of coal in pounds of sperm	838
Durability of 1 cubic foot of gas by 5 in. flame	50 minutes
Specific gravity of the gas (air, 1·000) ..	·503

This is a useful cannel coal, giving per ton 10,550 cubic feet of 23-candle gas, and 12½ cwt. of excellent coke.

Analyst—Robert R. Tatlock, F.R.S.E., F.C.S.
Date of Analysis—February 9, 1875.

FIFESHIRE. *Notes.*

LOCHGELLY IRON AND COAL COMPANY,

Lochgelly.

Colliery—LOCHGELLY, ... Seam, ... Pit.
Shipping Ports—Burntisland, Methil.
Rail—North British, Lochgelly, Cardenden, and Cowdenbeath Stations.
Canal— . . . . . .

Lochgelly Steam Coal.

Class of Coal—Steam.

	Per cent.		Cwt.	qr.	lb.
Volatile matters—gas, tar, water, &c...	41·87	per ton	8	1	14
Fixed carbon	55·08	,,	11	0	2
Ash	2·75	,,	0	2	5
Sulphur	0·30	,,	0	0	7
	100·00		20	0	0

Coke—57·98 per cent.

Heating powers, or number of pounds of steam produced by 1 lb. of coal	7·71
Weight of coke per ton of coal	11 cwt. 2 qr. 10 lb.
Fixed carbon in coke	94·99 per cent.
Ash in coke..	4·74 per cent.
Specific gravity of coal	1·290
Weight of cubic foot	80·6 lb.

This is a hard clean coal of excellent quality. The fixed carbon and steam-raising power are very high, while both sulphur and ash are low; the latter is of a light grey colour.

Analyst— . . . . . .
Date of Analysis— . . . . . .

Lochgelly Navigation Coal.

Class of Coal—Steam.

	Per cent.		Per cent. exclusive of Sulphur, Ash and Water.
Carbon	82·63	..	86·55
Hydrogen	5·05	..	5·29
Oxygen..	6·10	..	6·39
Nitrogen	1·69	..	1·77
Sulphur	0·66	..	—
Ash	1·42	..	—
Water	2·45	..	—
	100·00	..	100·00

Notes.

FIFESHIRE.

Lochgelly Navigation Coal—*cont.*	Per cent.
Fixed carbon	72·58
Volatile matter (other than sulphur and water) ..	22·89
Ash, sulphur and water	4·53
	100·00

Specific gravity 1·298, water at 60 degs. Fahr. being 1·000; colour of ash, reddish; nature of coal, caking; coke, 74·0 per cent., moderately fused; small bulk, and dull in appearance; total heat units (Favre and Silberman), 8,141; calorific power (Thomson), 7,679; evaporative power (Thomson), 14·30 lb. of water per pound of coal.

This coal closely resembles those of Monmouthshire, but the best Monmouthshire coals usually cake more freely. The best Cardiff steam coals contain from 87 to 89 per cent. of carbon, 4 to 5 per cent. of hydrogen, and 2 to 4 per cent. of oxygen. The coke ranges from 83 to 84 to 87 or 88 per cent., and in the drier coals up to 90, or even 91 per cent. The total heat units usually vary from 8,400 to 8,700, and the evaporative power (determined by Thomson's calorimeter) varies from 14·1 to 14·2 to 14·5 or 14·6 lb. of water per pound of coal.

The Monmouthshire coals usually contain less carbon, and a little more hydrogen and oxygen, and the coke ranges from 75 to 85 per cent. Those are merely rough figures, as the coals vary in nature and composition.

Analyst—Thomas Hughes, F.I.C.

Date of Analysis—March 4, 1904.

Lochgelly Cannel Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal is black, possesses considerable lustre and brown streak; fracture irregular, undulating, and semi-conchoidal; cross-fracture highly conchoidal to coarse and hackly, with deposits of calcium carbonate and ferric bisulphide; very cohesive and compact; under distillation it does not intumesce; colour of ash, white; thickness of seam, 22 in., and of very uniform density; mean specific gravity, 1·321 (water 1·000); weight of 1 cubic foot, 82·5 lb.

		Per cent.
Volatile matters (containing 0·58 of sulphur)		34·17
Coke, consisting of—		
Carbon	56·49	
Sulphur	0·17	
Ash	5·75	
		62·41
Water expelled at 212 degs. Fahr. ..		3·43
		100·00

FIFESHIRE.

Notes

Gaseous products :—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	10,870 cubic feet
Gas from 1 cubic foot of the coal	400·34 cubic feet
Specific gravity of the gas	·562 (air 1·000)
Hydrocarbons absorbed by bromine ..	8·80 per cent.
Durability of 1 cubic foot by 5 in. jet flame	56 min. 36 sec.
Value of 1 cubic foot of gas in sperm ..	634·32 grains
Value of gas from 1 ton of coal in sperm	985·00 lb.
Illuminating power of gas in standard candles	26·43 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·50 per cent.
Carbonic acid (CO_2) in foul gas	2·00 per cent.
Carbonic oxide (CO) in foul gas	7·50 per cent.
Sulphur eliminated with volatile products	12·99 lb.
Liquid products :—	
Tar per ton of coal	17·20 gallons
Ammoniacal liquor per ton of coal ..	13·86 gallons
Strength of ammoniacal liquor .. .	3·50 degs. Twadd.
Hygrometric water per ton of coal ..	7·66 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	5·25 per cent.
Solid products :—	
Coke per ton of coal	1,397·98 lb.
Carbon in the coke	90·80 per cent.
Ash in the coke	9·20 per cent.
Sulphur in coke per ton of coal	3·81 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	12·47 lb.

This is a good second-class cannel coal. It is easily distilled, yields a good average volume of 26·43-candle gas, and affords 12·48 cwt. of coke of fair quality per ton. The coal and foul gas at same time contain each a minimum amount of impurities. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 69·37.

Analyst—Geo. R. Hislop, F.C.S., M.S.C.Ind., F.R.S.S.A.

Date of Analysis—March 12, 1904.

Notes.

FIFESHIRE.

Lochgelly Duff Coal,

After treatment by patent coal-washer.

Class of Coal— . . . . . .

	Per cent.
Ash	8·10
Sulphur	0·46
Moisture	7·00
Volatile hydrocarbons	36·62
Fixed carbon	47·82
	100·00

Date of Analysis— . . . . . .

Analyst— . . . . . .

HENRY NESS AND CO. LIMITED,

Dunfermline.

Colliery—MUIRBEATH, Three-feet Seam, Muirbeath Pit.

Shipping Port—Burntisland, Methil, Leith, Dundee, Charlestown.

Rail—North British, Dunfermline Station.

Canal— . . . . . .

Muirbeath Cannel Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal is brownish black with yellowish brown streak; fracture, rather irregular and coarse, with impressions of stigmaria and finely diffused deposits of bright ferric bisulphide; cross-fracture is angular and curly, to semi-conchoidal, with slight deposits of calcium carbonate; compact and very cohesive; on the fire it intumesces and agglomerates; colour of ash, brown; mean specific gravity, 1·247 (water 1·000); weight of one cubic foot, 77·94 lb.

		Per cent.
Volatile matters (containing 0·46 of sulphur)		47·41
Coke, consisting of—		
Carbon	42·64	
Sulphur	0·18	
Ash	7·27	
		50·09
Water expelled at 212 degs. Fahr.		2·50
		100·00

FIFESHIRE.

Notes.

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar	13,807 cubic feet
Gas from 1 cubic foot of the coal	480·41 cubic feet
Specific gravity of the gas	·629 (air 1·000)
Hydrocarbons absorbed by bromine ..	13·75 per cent.
Durability of 1 cubic foot by 5 in. jet flame	66 min. 40 secs.
Value of 1 cubic foot of gas in sperm ..	818·40 grains
Value of gas from 1 ton of coal in sperm..	1,628·52 lb.
Illuminating power of gas in std. candles	34·10 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·25 per cent.
Carbonic acid (CO_2) in foul gas	2·00 per cent.
Carbonic oxide (CO) in foul gas	6·25 per cent.
Sulphur eliminated with volatile products	10·30 lb.
Liquid products—	
Tar per ton of coal	25·10 gallons
Ammoniacal liquor per ton of coal ..	9·40 gallons
Strength of ammoniacal liquor	3·70 degs. Twadd.
Hygrometric water per ton of coal ..	4·59 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	3·70 per cent.
Solid products—	
Coke per ton of coal	1,122·01 lb.
Carbon in the coke	85·50 per cent.
Ash in the coke	14·50 per cent.
Sulphur in coke per ton of coal	4·03 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	11·74 lb.

This is a first-class cannel coal, it is easily distilled, and yields an amount of illuminating matter considerably exceeding that obtained from Main Lesmahagow, and at same time contains a very small percentage of both sulphur and water.

Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas) this coal is equal to 107·91.

Analyst—Geo. R. Hislop, F.C.S., F.I.Inst., F.R.S.S.A.

Date of Analysis—April 20, 1895.

Notes.

FIFESHIRE.

Muirbeath Cairncubie Splint Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

This coal is black and of moderate to considerable lustre and brown streak ; fracture, partly laminated and partly irregular ; cross-fracture, angular, brighter portion inclines to conchoidal and resinoid, with slight deposits of calcium carbonate in the partings ; moderately cohesive, but rather porous ; thickness of seam, 42 in. ; mean specific gravity, 1·214 (water 1·000) ; weight of 1 cubic foot, 75·87 lb.

		Per cent.
Volatile matters (containing 0·44 of sulphur)		35·90
Coke, consisting of—		
Carbon	52·92	
Sulphur	0·18	
Ash	1·20	
		54·30
Water expelled at 212 degs. Fahr.		9·80
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	10,475 cubic feet
Gas from 1 cubic foot of the coal	354·79 cubic feet
Specific gravity of the gas	·558 (air 1·000)
Hydrocarbons absorbed by bromine ..	7·25 per cent.
Durability of 1 cubic foot by 5 in. jet flame	42 min. 48 secs.
Value of 1 cubic foot of gas in sperm ..	511·20 grains
Value of gas from 1 ton of coal in sperm ..	764·97 lb.
Illuminating power of gas in std. candles (per London Argand)	21·30 candles
Sulphuretted hydrogen (H_2S) in foul gas ..	1·20 per cent.
Carbonic acid (CO_2) in foul gas	3·50 per cent.
Carbonic oxide (CO) in foul gas	9·50 per cent.
Sulphur eliminated with volatile products	9·85 lb.
Liquid products—	
Tar per ton of coal	17·45 gallons
Ammoniacal liquor per ton of coal .	30·60 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal ..	21·95 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	14·46 per cent.

FIFESHIRE.

Notes.

Solid products—

Coke per ton of coal	1,216·32 lb.
Carbon in the coke	97·80 per cent.
Ash in coke	2·20 per cent.
Sulphur in coke per ton of coal	4·03 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	13·43 lb.

This is a good and useful coal for the production of gas, and claims special recommendation on account of the remarkably pure coke that it affords. It possesses a rather large aqueous absorbent capacity. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 57·19.

Analyst—Geo. R. Hislop, F.C.S., F.I.Inst., F.R.S.S.A.

Date of Analysis—August 24, 1895.

Muirbeath Three-feet Gas Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

The coal is black with brown streak, and moderate lustre; fracture partly inclines to slaty, while cross-fracture is angular, and partly highly resinoid with deposits of calcium carbonate and ferric bisulphide in the natural partings; moderately cohesive, but very porous; on the fire it intumesces and agglomerates; colour of ash, pale brown and flocculent; mean specific gravity, 1·206 (water 1·000); weight of 1 cubic foot, 75·37 lb.

		Per cent.
Volatile matters (containing 0·27 of sulphur)		36·79
Coke, consisting of—		
Carbon	51·77	
Sulphur	0·24	
Ash	2·00	
		54·01
Water expelled at 212 degs. Fahr.		9·20
		100·00

Notes.

FIFESHIRE.

Muirbeath Three-feet Gas Coal—*cont.*

Gaseous products—

Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	10,995 cubic feet
Gas from 1 cubic foot of the coal	369·95 cubic feet
Specific gravity of the gas	·534 (air 1·000)
Hydrocarbons absorbed by bromine ..	7·10 per cent.
Durability of 1 cubic foot by 5 in. jet flame	48 min. 8 secs.
Value of 1 cubic foot of gas in sperm ..	559·20 grains
Value of gas from 1 ton of coal in sperm ..	878·37 lb.
Illuminating power of the gas in standard candles	23·30 candles
Sulphuretted hydrogen (H_2S) in foul gas	0·60 per cent.
Carbonic acid (CO_2) in foul gas	4·10 per cent.
Carbonic oxide (CO) in foul gas	7·00 per cent.
Sulphur eliminated with volatile products	6·07 lb.

Liquid products—

Tar per ton of coal	16·53 gallons
Ammoniacal liquor per ton of coal ..	32·25 gallons
Strength of ammoniacal liquor	2·30 degs. Twadd.
Hygrometric water per ton of coal ..	20·60 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	14·20 per cent.

Solid products—

Coke per ton of coal	1,209·82 lb.
Carbon in the coke	96·30 per cent.
Ash in the coke	3·70 per cent.
Sulphur in the coke per ton of coal ..	5·35 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	13·23 lb.

This is an excellent splint coal. It yields a considerable volume of gas of unusually rich quality for a splint coal, and contains a very small amount of sulphur, but considerably over the average percentage of water. The coke is of first-class quality.

Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas) this coal is equal to 63·10.

Analyst—Geo. R. Hislop, F.C.S., F.I.Inst., F.R.S.S.A.

Date of Analysis—April 24, 1895.

FIFESHIRE.

Notes.

WILSONS AND CLYDE COAL COMPANY LIMITED,

75, Bothwell Street, Glasgow.

Colliery—GLENCRAIG, ... Seam, ... Pit.
Shipping Port— . . . . . .
Rail— . . . . . Station.
Canal— . . . . .

Glencraig Cannel Coal.

Class of Coal—Gas.

		Per cent.
Volatile matters (containing 0·39 of sulphur)		32·72
Coke, consisting of—		
Carbon	54·38	
Sulphur	0·19	
Ash	7·31	
		61·88
Water expelled at 212 degs. Fahr... ..		5·40
		100·00

Gaseous products—

Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	10,840 cubic feet
Gas from 1 cubic foot of the coal ..	375 cubic feet
Specific gravity of the gas	·543 (air 1·000)
Hydrocarbons absorbed by bromine ..	8·50 per cent.
Durability of 1 cubic foot by 5 in. jet flame	50 min. 47 sec.
Value of 1 cubic foot of gas in sperm ..	605 grains
Value of gas from 1 ton of coal in sperm..	937 lb.
Illuminating power in standard candles..	25·23 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·00 per cent.
Carbonic acid (CO_2) in foul gas	3·60 per cent.
Carbonic oxide (CO) in foul gas .. .	8·20 per cent.
Sulphur eliminated with volatile products	8·83 lb.

Liquid products—

Tar per ton of coal	17 gallons
Ammoniacal liquor per ton of coal	25 gallons
Strength of ammoniacal liquor ..	2·80 degs. Twadd.
Hygrometric water per ton of coal ..	14·33 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) .. .	9·50 per cent.

Notes.

FIFESHIRE.

Glencraig Cannel Coal—*cont.*

Solid products—

Coke per ton of coal	1,386 lb.
Carbon in the coke	88·20 per cent.
Ash in the coke	11·80 per cent.
Sulphur in coke per ton of coal	4·46 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	12·05 lb.

This is a fairly good cannel coal, giving, as it does, over 10,800 cubic feet of 25-candle gas, while the amounts of water and sulphur are about the average. The coke is also of fairly good quality, although the percentage of ash is a little high.

Analyst—Geo. R. Hislop, F.C.S., &c.

Date of Analysis— . . . . . .

Glencraig Wilson Navigation Steam Coal.

Class of Coal—Steam.

	Dry coal. Per cent.
Carbon	86·64
Hydrogen	4·99
Oxygen	4·06
Nitrogen	1·26
Sulphur	0·84
Ash	2·21
	100·00
Fixed carbon	70·50
Volatile matters (other than sulphur and water)	25·32
Ash, sulphur and water	4·18
	100·00

Specific gravity, 1·285, water at 60 degs. Fahr. being 1·000 ; colour of ash, yellowish ; nature of coal, caking ; total heat units (Favre and Silbermann), 8,399 ; calorific power (Thomson) 14·35 lb. of water per pound of coal, equivalent to 7,706 calories.

The character of this coal is somewhat similar to the more bituminous South Wales steam coals, but it resembles some of the best Monmouthshire steam coals still more closely. For house, furnace, or steam purposes this coal is of excellent quality.

This coal is on the British and Dutch Admiralty lists, and is one of the best bunker coals for ocean liners to be had in Scotland,

resembling best Welsh bunker fuel. It is exported to Baltic and Mediterranean ports, where it is used largely by the principal Continental railway companies.

Analyst—Thos. Hughes, F.I.C. (?)
Date of Analysis— . . . . . .

Glencraig Lochgelly Steam Coal.

Class of Coal—Steam and House.

		Per cent.
Volatile matters—		
Gas, tar, &c.	36·49	
Sulphur	0·24	
Water	6·12	
		42·85
Coke—		
Fixed carbon	53·37	
Sulphur	0·33	
Ash	3·45	
		57·15
		100·00

Heating power, practical, Playfair's formula (water at 212 degs. Fahr., evaporated by 1 lb. of coal)	8·06 lb.
Specific gravity	1·31
Weight of 1 cubic foot	81·87 lb.

This is an excellent coal in every respect. It is well adapted for steam-raising, and as it contains but little sulphur, and is very free from ash, it would be a very clean coal to handle and work. A steam coal producing less clinker could scarcely be found, and altogether it would give good results in practice. For household purposes this coal could hardly be surpassed.

This is known as a Fife first-class coal, and although it has not long been on the market, it already commands a good sale for ports in the Baltic and Mediterranean, having yielded splendid results.

Analyst— . . . . . .
Date of Analysis— . . . . . .

Notes.

HADDINGTON.

FORTH COLLIERIES (1902) LIMITED,

Preston Links, Prestonpans.

Colliery—PRESTON LINKS, ... Seam, Crown Pit.
Shipping Ports—Leith, Granton.
Rail—North British, Prestonpans Station.
Canal—None.

Forth Crown Hartley Jewel Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal possesses considerable lustre and brownish-black streak; fracture rather intermittent, with slight deposits of charcoal; cross-fracture angular, resinoid, and in part cubical with fine scaly deposits of calcium carbonate; compact, but rather friable; under distillation it intumesces and agglomerates; colour of ash, pale brown; thickness of seam 51 in., and very uniform in stratification and density, mean specific gravity being 1·251 (water, 1·000); weight of 1 cubic foot, 78·37 lb.

		Per cent.
Volatile matters (containing 0·53 of sulphur)		31·20
Coke, consisting of—		
Carbon	58·56	
Sulphur	0·18	
Ash	5·78	
		64·52
Water expelled at 212 degs. Fahr... ..		4·28
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	11,325 cubic feet
Gas from 1 cubic foot of the coal	396·22 cubic feet
Specific gravity of the gas	·483 (air 1·000)
Hydrocarbons absorbed by bromine ..	4·85 per cent.
Durability of 1 cubic foot by 5 in. jet flame	43 min. 28 sec.
Value of 1 cubic foot of gas in sperm ..	465·60 grains
Value of gas from 1 ton of coal in sperm..	753·27 lb.
Illuminating power of gas in standard candles (per London Argand)	19·40 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·50 per cent.
Carbonic acid (CO_2) in foul gas	2·25 per cent.
Carbonic oxide (CO) in foul gas	7·25 per cent.
Sulphur eliminated with volatile products	11·87 lb.

HADDINGTON.

Notes.

Liquid products—	
Tar per ton of coal	12·58 gallons
Ammoniacal liquor per ton of coal ..	17·33 gallons
Strength of ammoniacal liquor ..	2·75 degs. Twaddell
Hygrometric water per ton of coal ..	9·58 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	6·50 per cent.
Solid products—	
Coke per ton of coal	1,445·24 lb.
Carbon in the coke	91·05 per cent.
Ash in the coke ..	8·95 per cent.
Sulphur in coke per ton of coal	4·03 lb.
Heating power of 1 lb. of coke (water from boiling point into steam).. ..	12·51 lb.

This is an excellent gas and coking coal, and as such it yields of the former a considerable volume of 19¾-candle power, and of the latter nearly 13 cwt., of good quality per ton. The impurities in the foul gas are at same time very moderate in amount. The coal would prove a useful one also for steam-raising and general heating purposes.

Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 54·05.

Analyst—Geo. R. Hislop, F.C.S., M.S.C.Ind., F.R.S.S.A.
Date of Analysis—March 23, 1905.

Forth Crown Hartley Coal.

Class of Coal—Steam.

		Per cent.
Proximate analysis –		
Volatile matters:		
Gas, tar, &c.	32·84	
Sulphur	0·20	
Water at 212 degs. Fahr.	9·98	
		43·02
Coke:		
Fixed carbon	52·13	
Sulphur ..	0·20	
Ash	4·65	
		56·98
		100·00

Notes

HADDINGTON.

Forth Crown Hartley Coal—*cont.*

Specific gravity of the coal	1·29
Weight of 1 cubic foot	80 lb.
Coke per ton of coal	11 cwt. 1 qr. 16 lb.
Space occupied for stowage per ton of coal	42 cubic feet

Analysis of the coke (dry)—

	Per cent.
Carbonaceous or combustible matter	91·49
Sulphur	0·35
Ash	8·16
	100·00

Ultimate analysis of the coal—

Carbon	69·12
Hydrogen	4·53
Oxygen	9·97
Nitrogen	1·35
Sulphur	0·40
Ash	4·65
Water	9·98
	100·00

Calories or heat units Centigrade contained in the coal	6,719 calories
Heating power (theoretical) in weight of water at 212 degs. Fahr. converted into steam by 1 lb. of the coal	12·44 lb.

This coal contains very little ash or sulphur, and is suitable for the rapid generation of steam in boilers.

Analyst—John Clark, Ph.D.

Date of Analysis—May 23, 1905.

Notes.

LANARK.

ROBT. ADDIE AND SONS' COLLIERIES LIMITED,

127, St. Vincent Street, Glasgow.

Colliery—VIEWPARK, Splint Seam, ... Pit.
Shipping Ports—All Scotch Ports.
Rail—Caledonian and North British, Uddingston Station.
Canal—None.

Splint Coal.

Class of Coal—Gas.

	Per cent.	Per cent.
Volatile matter—		
Gas, tar, &c.	37·61	
Sulphur	0·70	
Water	6·74	
		45·05
Coke—		
Fixed carbon	49·54	
Sulphur	0·86	
Ash	4·55	
		54·95
		100·00
Heating power, practical (pounds of water at 212 degs. Fahr. evaporated by 1 lb. coal) ..		7·60 lb.
Specific gravity		1·30
Weight of 1 cubic foot		81·25 lb.

Analysts—R. R. Tatlock and Thomson.
Date of Analysis—August 10, 1903.

CADZOW COAL COMPANY LIMITED,

10, Bothwell Street, Glasgow.

Colliery—CADZOW, Hamilton, Lanarkshire, ... Seam, Nos. 1, 2 and 3 Pits.
Shipping Ports—Glasgow, Grangemouth, Bo'ness, Granton, Ardrossan, Greenock.
Rail—Caledonian, Cadzow Branch.
Canal—None.

Cadzow Ell Coal.

Class of Coal—Steam and House.

The sample measured 5 ft. 6 in. in height, being an entire section of the working.

Notes.

LANARK.

Cadzow Ell Coal—*cont.*

	Per cent.	Per cent.
Volatile matters—		
Gas, tar, &c.	34·03	
Sulphur	0·04	
Water at 212 degs. Fahr.	12·05	
		46·12
Coke—		
Fixed carbon	52·90	
Sulphur	0·03	
Ash	0·95	
		53·88
		100·00

	Cwt.	qr.	lb.
Coke (dry) per ton of coal, 1,205 lb., or ..	10	3	1

Analysis of the coke (dry):—

	Per cent.
Carbonaceous or combustible matter	98·18
Sulphur	0·06
Ash	1·76
	100·00

Specific gravity of the coal	1·250
Weight of a cubic foot	77¾ lb.
Space required for storage, per ton ..	43 cubic feet
Heating or evaporating power (practical) or pounds of water at 212 degs. converted into steam by the combustion of 1 lb. of coal ..	7·73 lb.

This coal possesses in an eminent degree the qualities for which the Ell coal, in the district where the Cadzow Colliery is situated, has long been famous. It is a household coal of the finest quality, burning with a bright voluminous flame, and giving great heat. It contains little more than a trace of sulphur, and of the many hundreds of coal samples I have tested I have not hitherto had one with so small a proportion of ash as the Cadzow coal. As a steam coal, it is of excellent quality for general use. It is also well adapted for shipping to foreign ports, as, from the small proportion of sulphur it contains, it will not be liable to undergo spontaneous combustion, and it possesses sufficient firmness to prevent it from being broken up in course of transit.

Analyst—William Wallace, F.R.S.E., F.C.S., F.I.C.
Date of Analysis—March 15, 1878.

LANARK.

Notes.

Cadzow "Oak Coal."

Class of Coal—House.

	Per cent.	Per cent.
Volatile matters—		
Gas, tar, &c.	34·20	
Sulphur	0·22	
Water at 212 degs. Fahr.	9·34	
		43·76
Coke—		
Fixed carbon	51·38	
Sulphur	0·28	
Ash	4·58	
		56·24
		100·00

Coke (dry) per ton of coal, 1,260 lb., or .. 11 cwt. 1 qr. 0 lb.

Analysis of the coke (dry):—	Per cent.
Carbonaceous or combustible matter ..	91·35
Sulphur	0·50
Ash	8·15
	100·00
Specific gravity of the coal ..	1·282
Weight of a cubic foot	80 lb.

Practical results:—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	9,815 cubic feet
Illuminating power in standard sperm candles by union jet consuming 5 cubic feet per hour at 0·5 in. pressure	14·55 candles
Value of 1 cubic foot of gas in sperm .	349 grains
Equivalent of a ton of coal in sperm ..	489 lb.
Durability of 1 cubic foot of gas by 5 in. flame	43 min. 0 sec.
Specific gravity of the gas (air = 1·000)..	·415

The sample consisted of a truckload weighing 6 tons 4 cwt., of which 4 tons 4 cwt. were used in the trial. Sugg's London Argand gave 19·29 candles, equal to 463 grains of sperm per cubic foot, and to 649 lb. of sperm per ton of coal.

Tar, 15 gallons per ton; liquor, 35 gallons of 4½ degs. Twaddell, and 6·8 oz. per gallon. This is equal to 20½ lb. sulphate of ammonia per ton of coal. The nitrogen is 1·52 per cent., equal to 160 lb. sulphate of ammonia per ton, so that not much more than one-eighth of the nitrogen is obtained as ammonia.

Analysts—William Wallace, F.R.S.E., F.C.S., F.I.C.

Date of Analysis—December 3, 1884.

Notes.

LANARK.

Cadzow Cannel Coal.

Class of Coal—Gas.

A sample truckload of this coal, representing the entire product of the seam, gave on examination the following results:—

Colour black, with moderate lustre and brown streak; fracture rather irregular and undulating; cross-fracture inclining to conchoidal, with deposits of calcium carbonate and ferric bisulphide in the natural partings; moderately cohesive, but rather porous; on the fire it decrepitates and flies partially and slightly intumesces; colour of ash, brownish-white; thickness of seam, 9 in. of cannel with $1\frac{1}{2}$ to 2 inches of adhering splint coal; mean specific gravity, 1·255 (water 1·000); weight of 1 cubic foot, 78·44 lb.

		Per cent.
Volatile matters (containing 0·53 of sulphur)		36·75
Coke, consisting of—		
Carbon	51·84	
Sulphur	0·26	
Ash	4·05	
		56·15
Water expelled at 212 degs. Fahr... ..		7·10
		100·00

Gaseous products:—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	10,860 cubic feet
Gas from 1 cubic foot of the coal	380·29 cubic feet
Specific gravity of the gas	·532 (air 1·000)
Hydrocarbons absorbed by bromine ..	8·20 per cent.
Durability of 1 cubic foot by 5 in. jet flame	53 min. 8 sec.
Value of 1 cubic foot of gas in sperm ..	612·72 grains
Value of gas from 1 ton of coal in sperm	950·59 lb.
Illuminating power of gas in standard candles	25·53 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·50 per cent.
Carbonic acid (CO_2) in foul gas	2·70 per cent.
Carbonic oxide (CO) in foul gas	7·30 per cent.
Sulphur eliminated with volatile products	11·86 lb.
Liquid products—	
Tar per ton of coal	17·50 gallons
Ammoniacal liquor, per ton of coal ..	28·50 gallons
Strength of ammoniacal liquor	2·40 degs. Twad.
Hygrometric water, per ton of coal ..	15·90 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	11·04 per cent.

Notes.

LANARK.

Solid products—

Coke per ton of coal	1,257·76 lb.
Carbon in the coke	92·80 per cent
Ash in the coke	7·20 per cent.
Sulphur in coke per ton of coal	5·83 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	12·75 lb.

This is an excellent coal of its class, alike for the production of both gas and coke, as in quality it is not excelled by any other coal from the well-known Lanarkshire splint seam to which it belongs. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas), this coal is equal to 67·21.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.

Date of Analysis—October 10, 1891.

Cadzow Splint Coal.

Class of Coal—Gas, Furnace, and Steam.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal is black to brownish black, possesses moderate lustre and brown streak; fracture, slaty and coarse, with slight deposits of charcoal; cross-fracture, angular and coarse, interlaminated with bituminous coal; traces only of calcium carbonate and ferric bisulphide; moderately cohesive and porous; under distillation it partly intumesces and agglomerates; colour of ash, pale brown; thickness of seam, 23 in., and of very uniform density; mean specific gravity being 1·213 (water 1·000); weight of 1 cubic foot, 75·81 lb.

		Per cent.
Volatile matters (containing 0·41 of sulphur)		35·92
Coke, consisting of—		
Carbon	52·26	
Sulphur	0·21	
Ash	4·09	
		56·56
Water expelled at 212 degs. Fahr.		7·52
		100·00

Notes.

LANARK.

Cadzow Splint Coal—*cont.*

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	10,875 cubic feet
Gas from 1 cubic foot of the coal	368·05 cubic feet
Specific gravity of the gas	·525 (air 1·000)
Hydrocarbons absorbed by bromine ..	6·80 per cent.
Durability of 1 cubic foot by 5 in. jet flame	48 min. 3 sec.
Value of 1 cubic foot of gas in sperm ..	540·00 grains
Value of gas from 1 ton of coal in sperm	838·92 lb.
Illuminating power of gas in standard candles (per London Argand) .. .	22·50 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·00 per cent.
Carbonic acid (CO_2) in foul gas	3·25 per cent.
Carbonic oxide (CO) in foul gas	8·00 per cent.
Sulphur eliminated with volatile products	9·18 lb.
Liquid products—	
Tar per ton of coal	16·20 gallons
Ammoniacal liquor per ton of coal ..	28·60 gallons
Strength of ammoniacal liquor	3·33 degs. Twadd.
Hygrometric water per ton of coal ..	16·84 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	10·30 per cent.
Solid products—	
Coke per ton of coal	1,266·94 lb.
Carbon in the coke	92·60 per cent.
Ash in the coke	7·40 per cent.
Sulphur in coke per ton of coal	4·70 lb.
Heating power of 1 lb. of coke (water from boiling point into steam) ..	12·72 lb.

This is one of the best coals of its class for the manufacture of gas and the production of coke, since of the former it yields a considerable volume of high quality and of the latter 11·31 cwt. of excellent quality per ton. The coal contains a very moderate amount of sulphur, and about the average percentage of water. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of purification of the gas) this coal is equal to 60·91.

Analyst—Geo. R. Hislop, F.C.S., M.S.C.Ind., F.R.S.S.A.

Date of Analysis—March 1, 1901.

LANARK.

Notes.

Cadzow Hartley Splint Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

The coal possesses moderate lustre and brownish-black streak ; fracture, slaty and in part glacy, with some deposits of charcoal ; cross-fracture, angular, with laminated bituminous coal of cubical fracture and resinoid, with some deposits of calcium carbonate and traces only of ferric bisulphide, massive and rather cohesive ; under distillation it partly intumesces and agglomerates ; colour of ash, brownish-grey ; thickness of seam, 20 in. ; mean specific gravity, 1,202 (water 1,000) : weight of 1 cubic foot, 75·1 lb.

		Per cent.
Volatile matters (containing 0·54 of sulphur)		35·25
Coke, consisting of–		
Carbon	52·31	
Sulphur	0·17	
Ash	5·07	
		57·55
Water expelled at 212 degs. Fahr. ..		7·20
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	11,300 cubic feet
Gas from 1 cubic foot of the coal ..	378·85 cubic feet
Specific gravity of the gas	496 (air 1,000)
Hydrocarbons absorbed by bromine ..	5·20 per cent.
Durability of 1 cubic foot by 5 in. jet flame	45 min. 48 sec.
Value of 1 cubic foot of gas in sperm ..	499·20 grains
Value of gas from 1 ton of coal in sperm	805·85 lb.
Illuminating power of gas in standard candles (per London Argand)	20·80 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·50 per cent.
Carbonic acid (CO_2) in foul gas	2·50 per cent.
Carbonic oxide (CO) in foul gas	5·50 per cent.
Sulphur eliminated with volatile products	12·10 lb.
Liquid products—	
Tar per ton of coal	17·30 gallons
Ammoniacal liquor per ton of coal ..	27·30 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal ..	16·12 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	10·40 per cent.

Notes.

LANARK.

Cadzow Hartley Splint Coal—*cont.*

Solid products—

Coke per ton of coal..	1,289·12 lb.
Carbon in the coke	91·20 per cent.
Ash in the coke	8·80 per cent.
Sulphur in coke per ton of coal	3·80 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	12·53 lb.

This is a very good gas and coking coal, yielding as it does a considerable volume of 20·8-candle gas, and affording 11½ cwt. of coke of good quality per ton. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 58·39.

Analyst—Geo. R. Hislop, F.C.S., M.S.C.Ind., F.R.S.S.A.
Date of Analysis—June 30, 1905.

Best House Coal.

Class of Coal—House.

	Per cent.
Moisture	9·45
Volatile combustible matter ..	29·67
Carbon	57·70
Ash	3·18
	100·00
Coke	60·80
Sulphur	0·52
Calorfic power	7,820 calories.
Water evaporated from and at 212 degs. Fahr. by 1 lb. of coal	14·56 lb.
Practical heating power, about	7·28 lb.

Analyst—Douglas A. MacCullum, F.C.S.
Date of Analysis—April 27, 1905.

LANARK.

Notes.

CAPRINGTON AND AUCHLOCHAN COLLIERIES,

Coalburn, Lesmahagow.

Colliery—AUCHLOCHAN, Nine-foot Seam, Nos. 6, 7, 9 and 10 Pits.
Shipping Ports—Grangemouth, Glasgow.
Rail—Caledonian, Coalburn Station.
Canal—None.

Auchlochan Splint Coal.

Class of Coal—Gas, Steam, Manufacturing.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

Colour, black, and from dull to moderate lustre; fracture, partly defined by deposits of charcoal; cross-fracture, angular and partly cubical, with numerous alternated laminations of splint and free coal; moderately friable, but rather porous; on the fire it intumesces and agglomerates; colour of ash, brownish grey; thickness of seam 26 in., of which 11 in. are hard splint and 15 in. semi-splint and free coal; mean specific gravity, 1·250 (water 1·000); weight of 1 cubic foot, 78·12 lb.

		Per cent.
Volatile matters (containing 0·51 of sulphur)		36·84
Coke, consisting of—		
Carbon	51·77	
Sulphur	0·29	
Ash	2·40	
		54·46
Water expelled at 212 degs. Fahr. ..		8·70
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	10,720 cubic feet
Gas from 1 cubic foot of the coal	374·31 cubic feet
Specific gravity of the gas	·512 (air 1·000)
Hydrocarbons absorbed by bromine ..	6·5 per cent
Durability of 1 cubic foot by 5 in. jet flame	47 min. 28 sec.
Value of 1 cubic foot of gas in sperm ..	534·24 grains
Value of gas from 1 ton of coal in sperm	818·15 lb.
Illuminating power of gas in standard candles	22·26 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·50 per cent.
Carbonic acid (CO_2) in foul gas	3·10 per cent.
Carbonic oxide (CO) in foul gas	5·20 per cent.
Sulphur eliminated with volatile products	13·72 lb.

Notes.

LANARK.

Auchlochan Splint Coal—*cont.*

Liquid products—	
Tar per ton of coal	19·20 gallons
Ammoniacal liquor per ton of coal	31·60 gallons
Strength of ammoniacal liquor	2·30 degs. Twadd.
Hygrometric water per ton of coal ..	19·48 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	12·10 per cent.
Solid products—	
Coke per ton of coal	1,212·73 lb.
Carbon in the coke	95·60 per cent.
Ash in the coke	4·40 per cent.
Sulphur in coke per ton of coal	6·44 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	13·13 lb.

While yielding a good average volume of 22¼-candle gas, this splint coal affords 10·82 cwt. of first-class coke. It contains about the average percentage of sulphur, but rather more than the average amount of water. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 60·25.

Analyst—Geo. R Hislop.

Date of Analysis—August 8, 1890.

Colliery—AUCHLOCHAN, Six-foot Seam, Nos. 1 and 7 Pits.

Auchlochan Six-feet Splint Coal.

Class of Coal—Gas, Steam, Manufacturing.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—Colour, dullish black; fracture, generally irregular, partly defined by deposits of vegetable charcoal; cross-fracture, angular to cubical, partly exhibiting well-defined and alternating laminations of dull black and bright coal, and partly hard and more uniform structure; moderately friable, but rather porous; on the fire it intumesces and agglomerates: colour of ash, pale brown; thickness of seam, 6 ft.; mean specific gravity, 1·299 (water, 1·000); weight of 1 cubic foot, 81·18 lb.

		Per cent.
Volatile matters (containing 0·48 of sulphur)		37·14
Coke, consisting of—		
Carbon	49·96	
Sulphur	0·34	
Ash	4·26	
		54·56
Water expelled at 212 degs. Fahr. ..		8·30
		100·00

LANARK.

Notes.

Gaseous products :—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	10,580 cubic feet
Gas from 1 cubic foot of the coal	382·53 cubic feet
Specific gravity of the gas	·508 (air 1·000)
Hydrocarbons absorbed by bromine ..	6·66 per cent.
Durability of 1 cubic foot by 5 in. jet flame	47 min. 36 sec.
Value of 1 cubic foot of gas in sperm ..	532·32 grains
Value of gas from 1 ton of coal in sperm ..	804·56 lb.
Illuminating power of gas in standard candles	22·18 candles
Sulphuretted hydrogen (H_2S) in foul gas ..	1·50 per cent.
Carbonic acid (CO_2) in foul gas .. .	3·00 per cent.
Carbonic oxide (CO) in foul gas ..	4·50 per cent.
Sulphur eliminated with volatile products	10·75 lb.
Liquid products—	
Tar per ton of coal	18·27 gallons
Ammoniacal liquor per ton of coal ..	32·16 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal ..	18·59 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) . ..	12·30 per cent.
Solid products :—	
Coke per ton of coal	1,222·14 lb.
Carbon in the coke	92·20 per cent.
Ash in the coke	7·80 per cent.
Sulphur in coke per ton of coal	7·61 lb.
Heating power of 1 lb. of coke (water from boiling point into steam) .. .	12·66 lb.

This is a good splint coal for the production of both gas and coke. It contains a moderate amount of sulphur, but rather over the average percentage of water. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 57·66.

Analyst—Geo. R. Hislop.

Date of Analysis—January 10, 1891.

Notes.

LANARK.

Colliery—AUCHLOCHAN, Six-foot Seam, No. 7 Pit.

Auchlochan Brown Splint Coal.

Class of Coal—Gas, Steam.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

Colour, dull brown to brownish black ; fracture, generally slaty, and in part contains thin deposits of vegetable charcoal; cross-fracture, angular and coarse, with slight deposits of calcium carbonate; moderately cohesive and compact; on the fire it intumesces and agglomerates ; colour of ash, brownish grey ; thickness of seam, 9 in. ; mean specific gravity, 1·248 (water, 1·000); weight of 1 cubic foot, 78 lb.

	Per cent.	Per cent.
Volatile matters (containing 0·56 of sulphur)		38·88
Coke, consisting of—		
Carbon	48·55	
Sulphur	0·35	
Ash	5·32	
		54·22
Water expelled at 212 degs. Fahr.		6·90
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	10,770 cubic feet
Gas from 1 cubic foot of the coal	375·02 cubic feet
Specific gravity of the gas	·525 (air 1·000)
Hydrocarbons absorbed by bromine	8·20 per cent.
Durability of 1 cubic foot by 5 in. jet flame	50 min. 28 sec.
Value of 1 cubic foot of gas in sperm	576·96 grains
Value of gas from 1 ton of coal in sperm	887·69 lb.
Illuminating power of gas in standard candles	24·04 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·75 per cent.
Carbonic acid (CO_2) in foul gas	3·00 per cent.
Carbonic oxide (CO) in foul gas	5·25 per cent.
Sulphur eliminated with volatile products	12·54 lb.
Liquid products—	
Tar per ton of coal	18·72 gallons
Ammoniacal liquor per ton of coal	28·10 gallons
Strength of ammoniacal liquor	2·50 degs. Twaddell.
Hygrometric water per ton of coal	15·45 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	11·20 per cent.

Notes.

LANARK.

Solid products—

Coke per ton of coal	1,214·52 lb.
Carbon in the coke	90·20 per cent.
Ash in the coke	9·80 per cent.
Sulphur in coke per ton of coal	7·84 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	12·39 lb.

This is one of the best gas-yielding splint coals that I have examined. It at same time affords an excellent hard and spongy coke. The amounts of water and sulphur in the coal are, however, slightly over the average. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas), this coal is equal to 61·58.

Analyst—Geo. R. Hislop.

Date of Analysis—January 7, 1891.

Colliery—AUCHLOCHAN, Steam Coal Seam, No. 6 Pit.

Auchlochan Steam Coal.

Class of Coal—Steam.

A sample of this coal, representing the product of the seam, gave on examination the following results:—

The coal possesses moderate to considerable lustre, is partly uniform in stratification and partly alternated by laminæ of dull black and bright coal; contains slight deposits of vegetable charcoal, and is moderately cohesive and porous; on the fire it intumesces and agglomerates; mean specific gravity, 1·284 (water 1·000); weight of 1 cubic foot, 80·2 lb.

Proximate analysis.—The coal when heated yields:—

	Per cent.	Lb. per ton.
Volatile combustible matter	31·56	706·94
Fixed carbon	56·68	1,269·63
Ash	4·04	90·50
Sulphur	0·22	4·93
Water	7·50	168·00
	100·00	2,240·00
Coke per ton of coal	60·82	1,362·36

Notes.

LANARK.

Auchlochan Steam Coal—*cont.*

Ultimate analysis :—Constituents of the coal—

	Per cent.
Carbon	75·34
Hydrogen	5·38
Nitrogen	1·36
Oxygen	6·16
Sulphur	0·22
Ash	4·04
Hygroscopic water	7·50
	100·00

Calorific or heat-producing power of the coal as determined by the calorimeter—1 lb. of the coal by perfect combustion evolves sufficient heat to raise 13·690 lb. of water 1 deg. Fahr. in temperature, being equal to 76·06 lb. of water from 32 degs. to 212 degs. Fahr., or to 91·26 lb. of water from 62 degs. to 212 degs. Fahr., or to 12·26 lb. of water from 62 degs. to 212 degs. Fahr., thence into steam, or to 14·17 lb. of water from 212 degs. Fahr. into steam.

The foregoing results prove this coal to be well adapted for the production of steam. It contains a considerable proportion of the heat-generating elements, carbon and hydrogen, with a small percentage of ash, and claims special recommendation on account of the exceptionally small quantity of sulphur it contains. By a practical test in a steam boiler furnace, under a moderate to a vigorous draught, the coal produced an intense and long-sustained heat, leaving a pale brown ash.

Analyst—George R. Hislop.
Date of Analysis—February 4, 1891.

Colliery—AUCHLOCHAN, Smithy Coal Seam, No. 6 Pit.

Auchlochan Smithy Coal.

Class of Coal—Gas, Steam, Manufacturing.

A sample of this coal, representing the product of the seam, gave on examination the following results :—

The coal is black and possesses moderate to considerable lustre ; the fracture is partly semi-cubical and partly uniform in stratification, exhibiting alternate laminæ of dull black and bright coal ; moderately cohesive and porous ; on the fire it intumesces and agglomerates ; colour of ash, pale brown ; mean specific gravity, 1·284 (water 1·000) ; weight of 1 cubic foot, 80·25 lb.

LANARK.

Notes.

Proximate analysis—	Per cent.
Combustible matters	88·24
Ash	4·04
Sulphur	0·22
Water	7·50
	100·00
Coke per ton of the coal	60·82

Ultimate analysis :—Constituents of the coal—

	Per cent.
Carbon	73·34
Hydrogen	5·38
Nitrogen	1·36
Oxygen	6·16
Sulphur	0·22
Ash	4·04
Hygroscopic water	7·50
	100·00

While the foregoing results prove this to be a coal of high heating power, it possesses also all the other essential characteristics of a first-class smithy coal, and amongst these an exceedingly small percentage of sulphur, and the property of intumescence and agglomeration when heated.

Analyst—Geo. R. Hislop.
Date of Analysis—February 7, 1891.

Colliery—AUCHLOCHAN, Six-foot Seam, Nos. 7, 9 and 10 Pits.

Auchlochan Lesmahagow Six-foot Cannel Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—Colour, brownish black, with moderate lustre and brown streak ; fracture, rather coarse and irregular with impressions of stigmaria ; cross-fracture, semi-conchoidal and angular, exhibiting laminæ of bituminous coal and slight deposits of ferric bisulphide in the natural partings ; compact and cohesive ; on the fire it partially and slightly intumesces ; colour of ash, pale pinkish brown ; thickness of seam, 5½ to 6 inches, and well defined ; mean specific gravity, 1·260 (water, 1·000) ; weight of 1 cubic foot, 78·75 lb.

		Per cent.
Volatile matters (containing 0·57 of sulphur)		43·57
Coke, consisting of—		
Carbon	36·87	
Sulphur	0·24	
Ash	16·22	
		53·33
Water expelled at 212 degs. Fahr... .		3·10
		100·00

Notes.

LANARK.

Auchlochan Lesmahagow Six-foot Cannel Coal—*cont.*

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	12,716 cubic feet
Gas from 1 cubic foot of the coal	447·04 cubic feet
Specific gravity of the gas	·578 (air 1·000)
Hydrocarbons absorbed by bromine ..	13·10 per cent.
Durability of 1 cubic foot by 5 in. gas flame	62 min. 18 sec.
Value of 1 cubic foot of gas in sperm ..	778·32 grains
Value of gas from 1 ton of coal in sperm..	1,413·87 lb.
Illuminating power of gas in standard candles	32·43 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·75 per cent.
Carbonic acid (CO_2) in foul gas	2·75 per cent.
Carbonic oxide (CO) in foul gas	5·50 per cent.
Sulphur eliminated with volatile products	12·77 lb.
Liquid products—	
Tar per ton of coal	23·75 gallons
Ammoniacal liquor per ton of coal ..	12·80 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal ..	6·94 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	4·00 per cent.
Solid products—	
Coke per ton of coal	1,194·59 lb.
Carbon in the coke	69·60 per cent.
Ash in the coke	30·40 per cent.
Sulphur in coke per ton of coal ..	5·37 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	9·53 lb.

This coal yields a large amount of illuminating matter per ton, and contains a small percentage of water, with about the average amount of sulphur. The coal, however, is of little value as a fuel. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas) this coal is equal to 86·40.

Analyst—Geo. R. Hislop, F.C.S., &c.

Date of Analysis—August 28, 1890.

Notes.

LANARK.

THE CHAPEL COAL COMPANY LIMITED,

Morningside, Newmains.

Colliery—CHAPEL and WATSTONFOOT, Drumgray Seam, Chapel Pit.
Shipping Ports—Glasgow, Grangemouth, Bo'ness, Leith.
Rail—Caledonian and North British, Morningside Station.
Canal—None.

Chapel and Watstonfoot Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

	Per cent.	Per cent.
Volatile matters—		
Gas tar, &c.	34·98	
Sulphur	0·25	
Water at 212 degs. Fahr. .	10·86	
		46·09
Coke—		
Fixed carbon	52·21	
Sulphur	0·26	
Ash	1·44	
		53·91
		100·00

Coke per ton of coal	10 cwt. 3 qr. 3 lb.
Specific gravity of the coal	1·273
Weight of 1 cubic foot	79½ lb.
Heating power (practical) in pounds of boiling water converted into steam by 1 lb. of the coal	7·87 lb.

Analysis of the coke (dry)—

	Per cent.
Carbonaceous or combustible matter ..	96·85
Sulphur	0·48
Ash	2·67
	100·00

Analyst—John Clark.

Date of Analysis—July 4, 1890.

Notes.

LANARK.

Collieries—CHAPEL and WATSTONFOOT, Drumgray and Kiltongue Seams, Chapel Pit.

Chapel Drumgray Coal.

Class of Coal—Gas.

	Per cent.
Volatile matters, tar, &c. ..	34·39
Coke	57·46
Water	8·15
	100·00

Gas per ton at 60 degs. Fahr. and 30 in. bar...	10,515 cubic feet
Illuminating power of gas	21·03 candles
Coke per ton of coal	1,287·10 lb.
Carbon in the coke	94·14 per cent.
Ash	5·86 per cent.
Sulphuretted hydrogen in foul gas	1·20 per cent.
Carbonic acid in foul gas..	3·00 per cent.

This coal possesses considerable lustre, is irregular in fracture, and cubical in cross-fracture. It yields a good volume of 21-candle power gas, and affords about 11½ cwt. of excellent coke.

Analyst—Geo. R. Hislop, F.C.S. &c.

Date of Analysis— . . . . . .

G. CROOKSTON AND SON,

Mount Florida, Glasgow.

Colliery—AIKENHEAD, Ell and Main Seams, Nos. 1 and 2 Pits.

Shipping Port— Glasgow.

Rail—Aikenhead Colliery Siding, *viâ* Newton, C.R.

Canal— . . . . . .

Aikenhead Cannel Coal.

Class of Coal—Gas.

		Per cent.
Volatile matters—		
Gas, tar, &c.	39·84	
Sulphur	0·42	
Water at 212 degs. Fahr. ..	8·70	
	——	48·96
Coke—		
Fixed carbon	47·92	
Sulphur	0·42	
Ash	2·70	
	——	51·04
		100·00

LANARK.

Notes.

Coke (dry), per ton of coal	10 cwt., 0 qrs., 23 lb.
	Per cent.
Analysis of the coke (dry)—	
Carbonaceous or combustible matter ..	93·89
Sulphur	0·82
Ash	5·29
	100·00
Specific gravity of the coal	1·273
Weight of 1 cubic foot	79·5 lb.
Gas per ton of coal, at 60 degs. Fahr. and 30 in. bar.	10,535 cubic feet
Illuminating power, in standard sperm candles, by union jet consuming 5 cubic feet per hour	23·35 candles
Value of 1 cubic foot of the gas in sperm ..	560 grains
Equivalent of 1 ton of the coal in sperm ..	842·8 lb.
Durability of 1 cubic foot of the gas, by 5 in. flame	48 min. 48 sec.
Specific gravity of the gas (air = 1·000) ..	·497

This coal yields a good volume of 23-candle gas and a coke of first-class quality.

Analyst—John Clark, Ph.D., F.C.S., &c.

Date of Analysis—March 11, 1893.

DARNGAVIL COAL COMPANY LIMITED,

40, St. Enoch Square, Glasgow.

Colliery—BIRKRIGG, ... Seam, ... Pit.

Shipping Ports—Glasgow, Greenock, Bo'ness, Grangemouth, Leith, Granton.

Rail—Caledonian, Dalserf Station.

Canal— . . . . . .

Birkrigg Virtuewell Coal.

Class of Coal— . . . . . .

	Per cent.	Per cent.
Volatile matter—		
Gas, tar, &c.	36·72	
Sulphur	0·30	
Water	9·28	
		46·30

Notes.

LANARK.

Birkrigg Virtuewell Coal—*cont.*

Coke—		
Fixed carbon	52·05	
Sulphur	0·35	
Ash	1·30	
		53·70
		100·00
Specific gravity		1·25
Weight of 1 cubic foot		78·1 lb.
Heating power, practical, Playfair's formula (water at 212 degs. Fahr. evaporated by 1 lb. of coal)		7·90 lb

Analysts—R. R. Tatlock and Thomson.

Date of Analysis—December 15, 1903.

Colliery—SWINHILL, ... Seam, ... Pit.

Shipping Ports—Glasgow, Greenock, Bo'ness, Grangemouth, Leith, Granton.

Rail—Caledonian, Stonehouse Station.

Canal— . . . . . .

Swinhill Lower Drumgray Coal.

Class of Coal— . . . . . .

	Per cent.	Per cent.
Volatile matter—		
Gas, tar, &c.	33·43	
Sulphur	0·26	
Water	9·96	
		43·65
Coke—		
Fixed carbon	54·11	
Sulphur	0·34	
Ash	1·90	
		56·35
		100·00
Specific gravity		1·25
Weight of 1 cubic foot		78·12 lb.
Heating power, practical, Playfair's formula (water at 212 degs. Fahr. evaporated by 1 lb. of coal)		8·06 lb.

Analysts—R. R. Tatlock and Thomson.

Date of Analysis—December 18, 1903.

LANARK.

Notes.

Colliery—WEST LONGRIGG, ... Seam,
. . . . . Pit.
Shipping Ports—Glasgow, Greenock, Bo'ness, Grangemouth, Leith, Granton.
Rail—North British, Longriggend Station.
Canal— . . . . . .

Darngavil Anthracite Coal.

Class of Coal—Anthracite.

	Per cent.	Per cent.
Volatile matter—		
Gas, tar, &c.	7·29	
Sulphur	0·06	
Water	1·95	
Coke—		9·30
Fixed carbon	87·89	
Sulphur	0·56	
Ash	2·25	
		90·70
		100·00
Specific gravity		1·35
Weight of 1 cubic foot		84·37 lb.
Heating power, practical, Playfair's formula (water at 212 degs. Fahr. evaporated by 1 lb. of coal)		11·64 lb.

Analysts—R. R. Tatlock and Thomson.
Date of Analysis—December 15, 1903.

Colliery—DARNGAVIL, ... Seam, ...Pit.
Shipping Ports—Glasgow, Greenock, Bo'ness, Grangemouth, Leith, Granton.
Rail—North British, Rawyards Station.
Canal— . . . . . .

Darngavil Heading Coal.

Class of Coal—Gas.

The coal is black, possesses considerable lustre and brown streak; fracture, irregular, and partly defined by intermittent deposits of charcoal; cross-fracture, angular to cubical, and largely defined by thin deposits of calcium carbonate and trace of ferric bisulphide; moderately

Notes.

LANARK.

Darngavil Heading Coal—*cont.*

cohesive but compact; on the fire it intumesces and agglomerates; colour of ash, reddish brown; thickness of seam, 10 in.; mean specific gravity, 1·261 (water, 1·000); weight of 1 cubic foot, 78·81 lb.

		Per cent.
Volatile matters (containing 0·44 of sulphur)		34·14
Coke, consisting of—		
Carbon..	57·66	
Sulphur	0·16	
Ash	3·44	
		61·26
Water expelled at 212 degs. Fahr.		4·60
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	11,785 cubic feet
Gas from 1 cubic foot of the coal	414·41 cubic feet
Specific gravity of the gas	·561 (air 1·000)
Hydrocarbons absorbed by bromine	6·50 per cent.
Durability of 1 cubic foot by 5 in. jet flame	46 min. 38 sec.
Value of 1 cubic foot of gas in sperm	522·24 grains
Value of gas from 1 ton of coal in sperm	879·22 lb.
Illuminating power of gas in standard candles	21·76 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·25 per cent.
Carbonic acid (CO_2) in foul gas	2·00 per cent.
Carbonic oxide (CO) in foul gas	6·75 per cent.
Sulphur eliminated with volatile products	9·86 lb.
Liquid products—	
Tar per ton of coal	10·15 gallons
Ammoniacal liquor per ton of coal	18·30 gallons
Strength of ammoniacal liquor	2·66 degs. Twadd.
Hygrometric water per ton of coal	10·30 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	7·53 per cent.
Solid products—	
Coke per ton of coal	1,372·22 lb.
Carbon in the coke	94·40 per cent.
Ash in the coke	5·60 per cent.
Sulphur in coke, per ton of coal	3·58 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	12·97 lb.

This is a remarkably good splint coal for the production of both gas and coke, as it affords a considerable quantity of both of excellent quality, and at the same time contains a very moderate amount of both sulphur and water. Compared with Main Lesmahagow cannel coal, represented by

Notes.

100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas), this coal is equal to 62·51.

Analyst—Geo. R. Hislop, F.C.S., etc.

Date of Analysis—February 24, 1894.

Colliery—DARNGAVIL, ... Seam, ... Pit.

Shipping Ports—Glasgow, Greenock, Bo'ness, Grangemouth, Leith, Granton.

Rail—North British, Whiterigg, Slamannan Stations.

Canal— . . . . . .

Darngavil Greyrigg Steam Coal.

Class of Coal—Steam.

	Per cent.	Per cent.
Volatile matter—		
Gas, tar, &c.	18·001	
Sulphur	0·179	
Water	1·594	
		19·774
Coke—		
Fixed carbon	75·855	
Sulphur	0·347	
Ash	4·024	
		80·226
		100·000
Specific gravity		1·304
Heating power, practical (boiling water converted into steam by 1 lb. of the coal)		10·402 lb.

Analyst—G. C. Stewart.

Date of Analysis—October 19, 1891.

Notes.

LANARK.

Colliery—WEST LONGRIGG, ... Seam,
. . . . . Pit.
Shipping Ports—Greenock, Glasgow, Granton, Grangemouth, Leith, Bo'ness.
Rail—North British, Longriggend and Slamannan Stations.
Canal— . . . . . .

West Longrigg Navigation Steam Coal.

Class of Coal—Steam.

	Per cent.	Per cent.
Volatile matter—		
Gas, tar	21·30	
Sulphur	0·10	
Water at 212 degs.	1·50	
		22·90
Coke (15 cwt. 47 lb.)—		
Fixed carbon	73·00	
Sulphur	0·10	
Ash	4·00	
		77·10
		100·00

Specific gravity of the coal..	1·27
Weight of 1 cubic foot of the coal ..	79·37 lb.
Heating power (water at 212 degs. Fahr., which 1 lb. of coal can convert into steam)	10·02 lb.
Clinker and ash	4·00 per cent.

Analysis of the coke:—

	Per cent.
Fixed carbon	94·68
Sulphur	0·13
Ash	5·19
	100·00

Analyst—W. Wallace.

Date of Analysis— . . . . . , 1886.

Another analysis—

		Per cent.
Volatile matter—		
Gas, tar, &c.	14·44	
Sulphur	0·10	
Water	1·76	
		16·30

Notes.

LANARK.

Coke—		
Fixed carbon	80·48	
Sulphur	0·52	
Ash	2·70	
		83·70
		100·00
Specific gravity		1·363
Weight of 1 cubic foot		85·18 lb.
Heating power, practical (water evaporated by 1 lb. of coal)		10·90 lb.

Analysts—R. R. Tatlock and Thomson.
Date of Analysis—July 5, 1898.

Mr. JAMES GEMMELL,

Netherburn.

Colliery—SOUTH LONGRIGG, ... Seam,
. . . . . Pit.
Shipping Ports—Bo'ness, Grangemouth, Glasgow.
Rail—Caledonian, Netherburn Station.
Canal—None.

Coking Dross Coal.

Class of Coal— . . . . . .

	Per cent.
(*a*)	
Ash	5·90
Sulphur	1·10
Volatile hydrocarbons	36·96
Fixed carbon	56·04
Yield of coke	62·60
Ash in coke	9·40
Sulphur in coke	0·99
(*b*)	
Moisture	1·7
Volatile matters	22·177
Coke yield	73·346
Ash	4·476

Analyst— . . . . . .
Date of Analysis— . . . . . .

Notes.

LANARK.

HIRST COAL COMPANY,

118, Queen Street, Glasgow.

Colliery—SOUTH BLAIR, Parrot Seam, South Blair Pit.
Shipping Ports—Glasgow, Grangemouth, Bo'ness, Leith.
Rail—North British, near Harthill Station.
Canal— . . . . . .

Parrot or Shale Coal.

Class of Coal—Gas.

A truck load of this coal gave, on examination, the following results:—

		Per cent.
Volatile matter (containing 0·62 of sulphur) ..		23·42
Coke—		
Carbon	57·31	
Sulphur	0·84	
Ash	17·24	
		75·39
Water expelled at 212 degs. Fahr. ..		1·19
		100·00

Analysis of coke—	Per cent.
Carbon	76·02
Sulphur	1·12
Ash	22·86
	100·00

Gas from 1 ton of coal at 60 degs. Fahr., and 30 in. bar.	8,521	cubic feet
Durability of 1 cubic foot of gas by 5-in. jet flame	55 min. 30 sec.	
Illuminating power of gas in standard candles	26·01	candles
Value of gas from 1 ton of coal in sperm ..	759·87	lb.
Value of 1 cubic foot of gas in sperm	624·24	grains
Sulphur eliminated with volatile products ..	13·88	lb.
Coke (dry) per ton of coal	1,688·70	lb.
Sulphur in coke per ton of coal	18·816	lb.
Tar and ammoniacal liquor per ton of coal ..	10·20	gallons

In obtaining the foregoing practical results, 2½ tons of the coal were distilled in the ordinary way in practical working, and the gas was collected in a separate holder for examination.

Analyst—Alexander Bell.
Date of Analysis—April 16, 1898.

Notes.

LANARK.

Virtuewell Coal.

Class of Coal—House.

		Per cent.
Volatile matter—		
Gas, tar, &c.	27·79	
Sulphur	0·17	
Water	2·04	
		30·00
Coke—		
Fixed carbon	67·16	
Sulphur	0·39	
Ash	2·45	
		70·000
Specific gravity		1·304
Weight of 1 cubic foot		81·5 lb.
Heating power practical (water evaporated by 1 lb. of coal)		9·59 lb.

This is a coalseam of good quality. It may be regarded as a very clean coal, as it contains but little ash and is very free from sulphur.

Analysts—R. R. Tatlock, Readman, and Thomson.
Date of Analysis—February 19, 1897.

Colliery—HIRSTRIGG, Upper Drumgray Seam, Hirstrigg Pit.
Shipping Ports—Glasgow, Grangemouth, Bo'ness, Leith.
Rail—Caledonian, near Drumbowie Station.
Canal— . . . . . .

Hirstrigg Special Steam Coal.

Class of Coal—Smokeless, Steam.

		Per cent.
Volatile matter—		
Gas, tar, &c.	22·07	
Sulphur	0·28	
Water	2·59	
		24·94
Coke—		
Fixed carbon	70·53	
Sulphur	0·86	
Ash	3·67	
		75·06
		100·00
Heating power, practical, Playfair's formula (water at 212 degs. Fahr. evaporated by 1 lb. of coal)		9·84 lb.

Notes.

LANARK.

Hirstrigg Special Steam Coal—*cont.*

The analysis shows that this is a steam coal of very high quality. All the constituent parts are present in splendid proportion, and it would make an admirable steam coal for yachts, as the amount of smoke produced would be very slight, and on account of the small proportion of ash it would be a very clean coal. It has a high heating or evaporative power, and is altogether a coal exceedingly well adapted for the purpose for which it is intended.

Analysts—R. R. Tatlock and Thomson, F.I.C., F.R.S.E., F.C.S.
Date of Analysis—March 9, 1903.

Hirstrigg Navigation Steam Coal.

Class of Coal—Steam.

	Per cent.	Per cent.
Volatile matter—		
Gas, tar, &c.	28·05	
Sulphur	0·22	
Water	1·78	
		30·05
Coke—		
Fixed carbon	66·84	
Sulphur	0·51	
Ash	2·60	
		69·95
		100·00
Heating power, practical, Playfair's formula (water at 212 degs. Fahr. evaporated by 1 lb. of coal)		9·55 lb.
Specific gravity		1·28
Weight of 1 cubic foot		80·00 lb.

This is a steam coal of very high excellence. On account of its freedom from ash and sulphur, it is a very clean coal, and the large proportion of fixed carbon ensures a high heating and evaporative power. It may be taken all round as being a steam coal of the very highest class, and it is also an excellent navigation coal.

This coal is not friable, and can be handled in transit by train or ship with the minimum production of smalls.

Analysts—R. R. Tatlock and Thomson, F.I.C., F.R.S.E., F.C.S.
Date of Analysis—October 3, 1902.

Notes.

LANARK.

Hirstrigg Anthracite Coal.

Class of Coal—Smokeless.

A sample of this coal gave on examination the following results :—

The coal possesses considerable lustre; fracture, rather irregular, partly defined by thin deposits of charcoal; cross-fracture, angular to cubical, and highly resinoid to crystalline, with traces only of ferric bisulphide in the natural partings; very uniform in stratification, composition, and density; moderately cohesive and compact. Mean specific gravity, 1·289 (water 1·000). Weight of 1 cubic foot, 80·56 lb. Cubic feet per ton, 27·80.

Proximate analysis.—The coal when heated to 2,000 degs. F. yields :—

		Per cent.	Lb. per ton.
Volatile matters (smokeless)	9·430		
Fixed carbon	85·218		
		94·648	2,120·115
Ash		1·770	39·648
Sulphur		0·832	18·637
Moisture		2·750	61·600
		100·000	2,240·000

Ultimate analysis :—Constituents of the coal—

	Per cent.
Carbon	88·427
Hydrogen	3·560
Nitrogen	0·853
Oxygen	1·808
Sulphur	0·832
Ash	1·770
Hygroscopic water	2·750
	100·000

Calorific or heat-producing power of the coal, as determined by Thomson's calorimeter :—

One pound of the coal by perfect combustion evolves heat sufficient to convert 15·12 lb. of water from 212 degs. Fahr. into steam.

One pound will therefore raise 14,605 lb. of water 1 deg. Fahr. in temperature,
or equal to 81·14 lb. of water from 32 degs. to 212 degs. Fahr.,
or equal to 96·08 lb. of water from 60 degs. to 212 degs. Fahr.,
or equal to 13·06 lb. of water from 60 degs. to 212 degs. Fahr.,
thence into steam.

This is an exceptionally pure and high-class anthracite coal, containing little ash and very moderate amounts of sulphur and water. It

Notes

LANARK.

Hirstrigg Anthracite Coal—*cont.*

is extremely rich in fixed carbon, with great heating power, and contains a minimum percentage of volatile matter, thus rendering it practically smokeless, and therefore very suitable for malting, grain-drying, lime-burning, greenhouse stoves, or for any purpose where freedom from smoke is essential.

Analyst—Geo. R. Hislop, F.C.S., M.S.C.Ind., F.R.S.S.A.

Date of Analysis—December 13, 1900.

Hirstrigg Silkstone Coking Gas Coal.

Class of Coal—Gas.

	Per cent.	Per cent.
Volatile matter—		
Gas, tar, &c.	27·22	
Sulphur	0·27	
Water	1·54	
		29·03
Coke—		
Fixed carbon	64·38	
Sulphur	0·65	
Ash	5·94	
		70·97
		100·00

Specific gravity	1·28
Weight of 1 cubic foot	80 lb.
Coke (dry) per ton of coal	1,590 lb., or 14 cwt. 0 qr. 22 lb.

Analysis of the coke:—	Per cent.
Fixed carbon	90·71
Sulphur	0·92
Ash	8·37
	100·00

Gas per ton of coal at 60 degs. F., and 30 in. bar.	9,527 cubic feet
Illuminating power in standard sperm candles by union jet consuming 5 cubic feet per hour at 0·5 in. pressure	18·35 candles
Illuminating power by London Argand	22·60 candles
Value of 1 cubic foot of gas in sperm	440·4 grains
Equivalent of 1 ton of coal in sperm	599·4 lb.
Durability of 1 cubic foot of gas	40 minutes

This is a coal of very good quality, as it yields a large proportion of gas of high illuminating power, and is also a valuable coking coal. The coke is of excellent quality physically, and only contains average proportions of ash and sulphur.

Analysts—R. R. Tatlock and Thomson, F.I.C., F R.S.E., F.C.S.

Date of Analysis—April 22, 1903.

LANARK.

Notes.

KEIR AND MITCHELL,

Glenclelland, Wishaw.

Colliery—GLENCLELLAND, Shale above Virtuewell Seam, Glenclelland and Knownoble Pits.

Shipping Ports—Clyde and Forth ports.

Rail—Caledonian, Wishaw Station.

Canal— . . . . . .

Glenclelland Shale.

Class of Coal— . . . . . .

Colour, dull brownish black, with yellowish brown streak; fracture, coarse and inclining to slaty, and exhibiting numerous small silvery planes or finely-diffused deposits of ferric bisulphide; cross-fracture, angular and coarse, but clean in the partings; very compact and cohesive; in the retort it pretty much retains its form; thickness of seam, 4 in.; mean specific gravity, 1·296 (water, 1·000); weight of 1 cubic foot, 81 lb.

		Per cent.
Volatile matters (containing 0·56 of sulphur)		38·04
Coke, consisting of—		
Carbon	31·93	
Sulphur	0·37	
Ash	27·26	
		59·56
Water expelled at 212 degs. Fahr... ..		2·40
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar	10,502 cubic feet
Gas from 1 cubic foot of the coal ..	379·76 cubic feet
Specific gravity of the gas	·588 (air 1·000)
Hydrocarbons absorbed by bromine ..	14·00 per cent:
Durability of 1 cubic foot by 5 in. jet flame	67 min. 10 sec.
Value of 1 cubic foot of gas in sperm ..	823·20 grains
Value of gas from 1 ton of coal in sperm	1,235·03 lb.
Illuminating power of gas in standard candles	34·30 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·80 per cent.
Carbonic acid (CO_2) in foul gas .. .	2·00 per cent.
Carbonic oxide (CO) in foul gas	7·00 per cent.
Sulphur eliminated with volatile products	13·17 lb.

Notes.

LANARK.

Glenclelland Shale—*cont.*

Liquid products—

Tar per ton of coal	17·31 gallons
Ammoniacal liquor per ton of coal ..	9·45 gallons
Strength of ammoniacal liquor	3·00 degs. Twadd.
Hygrometric water per ton of coal ..	5·37 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)..	2·75 per cent.

Solid products—

Coke per ton of coal	1,234·14 lb.
Carbon in the coke	54·24 per cent.
Ash in the coke	45·76 per cent.
Sulphur in coke per ton of coal	7·66 lb.
Heating power of one pound of coke (water from boiling point into steam)	7·45 lb.

Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas), this shale is equal to 70·24.

Analyst—Geo. R. Hislop, F.C.S., etc.

Date of Analysis—June 15, 1889.

Glenclelland Caking Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

Colour, dullish black; fracture, rather coarse, with deposits of fibrous charcoal; cross-fracture exhibits numerous alternate laminations possessing slightly varying lustre, as also trace of ferric bisulphide in the natural partings; moderately friable but rather porous; on the fire it intumesces and agglomerates; colour of ash, greyish brown; thickness of seam, 29 in.; mean specific gravity, 1·282 (water, 1·000); weight of 1 cubic foot, 80·25 lb.

		Per cent.
Volatile matters (containing 0·31 of sulphur)		36·11
Coke, consisting of—		
Carbon	52·70	
Sulphur	0·21	
Ash	3·38	
		56·29
Water expelled at 212 degs. Fahr.		7·60
		100·00

LANARK.

Notes.

Gaseous products—		
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	10,770	cubic feet
Gas from 1 cubic foot of the coal	379·20	cubic feet
Specific gravity of the gas	·482	(air 1·000)
Hydrocarbons absorbed by bromine ..	6·66	per cent.
Durability of 1 cubic foot by 5 in. jet flame	47	min. 50 sec.
Value of 1 cubic foot of gas in sperm ..	538·08	grains
Value of gas from 1 ton of coal in sperm	827·87	lb.
Illuminating power of gas in standard candles	22·42	candles
Sulphuretted hydrogen (H_2S) in foul gas	1·20	per cent.
Carbonic acid (CO_2) in foul gas	3·10	per cent.
Carbonic oxide (CO) in foul gas	6·75	per cent.
Sulphur eliminated with volatile products	7·29	lb.
Liquid products—		
Tar per ton of coal	17·10	gallons
Ammoniacal liquor per ton of coal ..	30·50	gallons
Strength of ammoniacal liquor	2·50	degs. Twadd.
Hygrometric water per ton of coal ..	17·02	gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	11·30	per cent.
Solid products—		
Coke per ton of coal	1,260·89	lb.
Carbon in the coke	94·00	per cent.
Ash in the coke	6·00	per cent.
Sulphur in coke per ton of coal	4·35	lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	12·91	lb.

Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 59·95.

Analyst—Geo. R. Hislop, F.C.S., etc.

Date of Analysis—June 3, 1889.

Notes.

LANARK.

A. G. MOORE AND CO.,

142, St. Vincent Street, Glasgow.

Colliery—BLANTYREFERME, Virgin Coal Seam, Blantyreferme Pit.
Shipping Port—Glasgow.
Rail—Caledonian Railway, Uddingston Station.
Canal— . . . . .

Blantyreferme House Coal.

Class of Coal—House.

	Per cent.
Gas, tar, &c. . .	36·39
Water . .	10·11
Fixed carbon	49·61
Ash	3·89
	100·00

Analysts—R. R. Tatlock and Thomson, F.I.C.
Date of Analysis—September 23, 1902.

Colliery—BLANTYREFERME, Ell Coal Seam, Blantyreferme Pit.

Blantyreferme Ell Coal.

Class of Coal—Gas Coal.

Gas per ton of coal	9,070 cubic feet
Illuminating power in standard candles	17·57 candles
Sperm equivalent	542·7
Coke per ton of coal	1,300 lb.
Ash in coke	10·02 per cent.
Silica in coke	5·72 per cent.
Sulphur in coke	1·25 per cent.
Phosphorus in coke	0·037

Analyst—Working analysis of coal, as tested at Glasgow Corporation Gas Works.

Date of Analysis—April, 1903.

Colliery—BLANTYREFERME, Splint Coal Seam, Blantyreferme Pit.

Blantyreferme Splint Coal.

Class of Coal—Gas and Foundry Coal.

Gas per ton of coal	9,559 cubic feet
Illuminating power	19 standard candles
Coke per ton of coal	1,285 lb.
Ash in coke	7·80 per cent.
Sperm equivalent	622

Analyst—Working analysis of coal, as tested at Glasgow Corporation Gas Works.

Date of Analysis—May, 1905.

LANARK.

Notes.

JAMES NIMMO AND CO. LIMITED,

21, Bothwell Street, Glasgow.

Colliery—LONGRIGG, . . . Seam, Pit.
Shipping Port— . . .
Rail— . . Station.
Canal— .

Longrigg Anthracite Coal.

Class of Coal—

	Per cent.
Moisture ..	2·87
Ash	2·04
Volatile matter .. .	6·45
Fixed carbon ..	88·64
	100·00

This is one of the best samples of anthracite coal which I have had the opportunity of examining. It is a coal of quite exceptional purity. It is bright and lustrous in appearance, and very hard. It burns without evolution of smoke.

I have made a rigorous examination of the coal for arsenic, by a method capable of determining accurately less than one-tenth of a grain of arsenic per pound of coal, and find that no trace of arsenic exists. It is therefore eminently suited for the use of maltsters and others requiring a high-class smokeless fuel.

Analyst—W. Carrick Anderson, M.A., D.Sc.

Date of Analysis—August 11, 1903.

Longrigg Navigation Steam Coal.

Class of Coal—Steam.

	Dried sample. Per cent.
Carbon	87·65
Hydrogen	4·90
Oxygen	2·15
Nitrogen	2·57
Sulphur	0·91
Ash	1·82
	100·00

Notes.

LANARK.

Longrigg Navigation Steam Coal—*cont.*

	Per cent.
Fixed carbon	75·75
Volatile matters (other than sulphur and water	19·78
Sulphur and water	4·47
	100·00

	Per cent.
Specific gravity (water expelled at 60 degs. Fahr., 1·000)	1·303
Nature of the coal..	Sinter
Colour of ash	Buff
Calculated total heat units (by Dulong's formula)	8,697 units
Calorific power (by Thompson's calorimeter)	7,645
Net theoretical evaporative power (by calculation)	15·72 lb.
Evaporative power, by calorimeter (water at 212 degs. Fahr. converted into steam at same temperature)	14·26 lb.

This is a remarkably fine steam coal of the bituminous type. It contains a very small proportion of ash, and the percentages of carbon and hydrogen are not only high, but—what is very important from a heat-giving point of view—they are combined with an exceedingly small amount of oxygen. The nitrogen, as I have frequently found to be the case in Scotch coals of this class, is high, but the oxygen and nitrogen together amount only to 4·72 per cent.

This coal is equal to any of the Monmouthshire steam coals with which I am acquainted, and is surpassed only by the best Welsh.

Analyst—W. Carrick Anderson, M.A., D.Sc.
Date of Analysis—June 1, 1904.

Nimmo's Holytown Best House Coal.

Class of Coal—House.

	Per cent.
Moisture	8·65
Ash	2·19
Volatile matter	33·70
Fixed carbon..	55·46
	100·00

Analyst—W. Carrick Anderson, M.A., D.Sc.
Date of Analysis—August 11, 1903.

LANARK.

Notes.

Nimmo's Hartley Hamilton Ell Coal.

Class of Coal— . . . . . .

	Per cent.
Moisture	8·65
Ash	2·19
Volatile matter	33·70
Fixed carbon	55·46
	100·00

Analyst—W. Carrick Anderson, M.A., D.Sc.
Date of Analysis—August 11, 1903.

Mr. J. PARK,

Holytown.

Collieries—LINRIGG, Upper Drumgray Seam, Nos. 1, 6 and 7 Pits.
Shipping Port—Glasgow.
Rail—Caledonian, Salisburgh Station.
Canal— . . . . . .

Linrigg Splint Coal.

Class of Coal—Manufacturing, House.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

This seam consists of 13 in. of free coal and 9 in. hard splint; colour generally dullish black; fractures irregular in the free coal to semi-slaty in the splint, the former containing considerable deposits of vegetable charcoal, as also slight deposits of ferric bisulphide and calcium carbonate in the natural partings. The free coal is friable and porous, the splint moderately compact and cohesive. On the fire the free portion intumesces and slightly agglomerates; colour of ash, pale brown; mean specific gravity, 1·248 (water 1·000); weight of 1 cubic foot, 78·0 lb.

		Per cent.
Volatile matters (containing 0·43 of sulphur)		36·18
Coke, consisting of—		
Carbon	51·98	
Sulphur	0·24	
Ash	3·40	
		55·62
Water expelled at 212 degs. Fahr.		8·20
		100·00

Notes.

LANARK.

Linrigg Splint Coal—*cont.*

Gaseous products :—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	10,345 cubic feet
Gas from 1 cubic foot of the coal	360·22 cubic feet
Specific gravity of the gas ..	·478 (air 1·000)
Hydrocarbons absorbed by bromine	6·20 per cent.
Durability of 1 cubic foot by 5 in. jet flame	43 min. 28 sec.
Value of 1 cubic foot of gas in sperm	482·88 grains
Value of gas from 1 ton of coal in sperm..	713·62 lb.
Illuminating power of gas in standard candles	20·12 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·40 per cent.
Carbonic acid (CO_2) in foul gas	2·75 per cent.
Carbonic oxide (CO) in foul gas ..	7·75 per cent.
Sulphur eliminated with volatile products	9·63 lb.
Liquid products :—	
Tar per ton of coal	18·40 gallons
Ammoniacal liquor per ton of coal ..	33·60 gallons
Strength of ammoniacal liquor	2·5 degs. Twadd.
Hygrometric water per ton of coal ..	18·36 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	12·54 per cent.
Solid products :—	
Coke per ton of coal..	1,245·88 lb.
Carbon in the coke	93·90 per cent.
Ash in the coke	6·10 per cent.
Sulphur in coke per ton of coal . ..	5·37 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	12·90 lb.

While yielding a good volume of fully 20-candle gas, this splint coal affords upwards of 11 cwt. of first-class coke, and contains a moderate percentage of sulphur, but fully the average amount of water. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 54·04.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.

Date of Analysis—April 11, 1891.

LANARK.

Notes.

SHOTTS IRON COMPANY,

130, George Street, Edinburgh.

Colliery—CASTLEHILL, Drumgray Seam, ... Pit.
Shipping Ports—Glasgow, Grangemouth, Bo'ness, Leith.
Rail—North British and Caledonian, Carluke Station.
Canal—None.

Castlehill Coal.

Class of Coal—Steam.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

		Per cent.
Volatile matters (containing 0·47 sulphur)		33·99
Coke, consisting of—		
Carbon	55·12	
Sulphur	0·21	
Ash	2·43	
		57·76
Water expelled at 212 degs. Fahr... ..		8·25
		100·00

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.
Date of Analysis—March 19, 1892.

JOHN WATSON LIMITED,

53, Bothwell Street, Glasgow.

Colliery—EDDLEWOOD, Splint Seam, . Pit.
Shipping Ports—Glasgow, Greenock, Ardrossan, Grangemouth, Leith.
Rail—Caledonian, Meikle Earnock Station.
Canal—None.

Eddlewood Cannel Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

		Per cent.
Volatile matters (containing 0·44 of sulphur)		36·75
Coke, consisting of—		
Carbon	53·57	
Sulphur	0·36	
Ash	2·72	
		56·65
Water expelled at 212 degs. Fahr... ..		7·60
		100·00

Notes.

LANARK.

Eddlewood Cannel Coal—*cont.*

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	10,650 cubic feet
Gas from 1 cubic foot of the coal	373·22 cubic feet
Specific gravity of the gas	·506 (air 1·000)
Hydrocarbons absorbed by bromine ..	7·60 per cent.
Durability of 1 cubic foot by 5 in. jet flame	48 min. 16 sec.
Value of 1 cubic foot of gas in sperm ..	557·28 grains
Value of gas from 1 ton of coal in sperm..	847·86 lb.
Illuminating power of gas in standard candles	23·22 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·33 per cent.
Carbonic acid (CO_2) in foul gas	2·75 per cent.
Carbonic oxide (CO) in foul gas	7·20 per cent.
Sulphur eliminated with volatile products	9·86 lb.
Liquid products—	
Tar per ton of coal	16·52 gallons
Ammoniacal liquor per ton of coal ..	31·80 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal ..	17·02 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	10·60 per cent.
Solid products—	
Coke per ton of coal	1,268·96 lb.
Carbon in the coke	95·20 per cent.
Ash in the coke	4·80 per cent.
Sulphur in coke, per ton of coal	8·06 lb.
Heating power of 1 lb. of coke (water from boiling point into steam).. ..	13·08 lb.

Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 63·15.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.

Date of Analysis—April 28, 1891.

LANARK.

Notes.

Colliery—NEILSLAND, ... Seam, ... Pit.

Watson's Neilsland Best House Coal.

Class of Coal—House.

		Per cent.
Volatile matter—		
Gas, tar, &c.	34·63	
Sulphur	0·32	
Water	11·45	
Coke		46·40
Fixed carbon	51·79	
Sulphur	0·36	
Ash	1·45	
		53·60
		100·00
Specific gravity		1·30
Weight of 1 cubic foot		81·25 lb.
Heating power, practical, Playfair's formula (water at 212 degs. Fahr. evaporated by 1 lb. of coal)		7·80 lb.
Colour of ash		Light brown.

Analysts—R. R. Tatlock and Thomson.

Date of Analysis—February 18, 1905.

Watson's Neilsland Ell House Coal.

Class of Coal—House.

	Per cent.	Per cent.
Volatile matter—		
Gas, tar, &c.	36·21	
Sulphur	0·45	
Water	10·74	
Coke—		47·40
Fixed carbon	50·40	
Sulphur	0·50	
Ash	1·70	
		52·60
		100·00
Specific gravity		1·30
Weight of 1 cubic foot		81·25 lb.
Heating power, practical, Playfair's formula (water at 212 degs. Fahr. evaporated by 1 lb. of coal)		7·67 lb.
Colour of ash		Light brown.

Analysts—R. R. Tatlock and Thomson.

Date of Analysis—February 18, 1905.

Notes.

LANARK.

Collieries—EARNOCK, EDDLEWOOD, NEILSLAND and MOTHERWELL, ... Seam, ... Pit.
Shipping Ports—Glasgow, Greenock, Ardrossan, Grangemouth, Leith.
Rail—Caledonian and North British, Hamilton and Motherwell Stations.
Canal—None.

Watson's Duke of Hamilton Splint Coal.

Class of Coal— . . . . .

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

The coal is dull brownish black to black, with considerable lustre ; fracture in part inclines to slaty, undulating, and in part irregular and more friable, with deposits of ferric bisulphide and calcium carbonate in the natural partings ; under distillation the free portion intumesces and agglomerates ; colour of ash, brownish white ; thickness of seam, 22 in. ; mean specific gravity, 1·257 (water 1·000) ; weight of 1 cubic foot, 78·56 lb.

		Per cent.
Volatile matters (containing 0·62 of sulphur)		35·96
Coke, consisting of—		
Carbon	52·16	
Sulphur	0·15	
Ash	4·87	
		57·18
Water expelled at 212 degs. Fahr... ..		6·86
		100·00

Gaseous products :—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	11,135 cubic feet
Gas from 1 cubic foot of the coal	393·19 cubic feet
Specific gravity of the gas	·505 (air = 1·000)
Hydrocarbons absorbed by bromine ..	6·25 per cent.
Durability of 1 cubic foot by 5 in. jet flame	45 min. 36 sec.
Value of 1 cubic foot of gas in sperm ..	509·28 grains
Value of gas from 1 ton of coal, in sperm	810·11 lb.
Illuminating power of gas in standard candles (per London Argand) .. .	21·22 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·66 per cent.
Carbonic acid (CO_2) in foul gas	3·50 per cent.
Carbon oxide (CO) in foul gas	9·00 per cent.
Sulphur eliminated with volatile products	13·88 lb.

LANARK.

Notes.

Liquid products—	
Tar per ton of coal	17·50 gallons
Ammoniacal liquor per ton of coal ..	26·25 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water, per ton of coal ..	15·36 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	9·20 per cent.
Solid products—	
Coke per ton of coal..	1,280·83 lb.
Carbon in the coke	91·50 per cent.
Ash in the coke	8·50 per cent.
Sulphur in coke, per ton of coal	3·36 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	12·57 lb.

Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 56·63.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.
Date of Analysis—April 9, 1900.

WILSONS AND CLYDE COAL COMPANY LIMITED,

75, Bothwell Street, Glasgow.

Colliery—SHAWFIELD, ... Seam, ... Pit.
Shipping Port— . . . . . .
Rail— . . . . . Station.
Canal— . . . . . .

Shawfield Splint Coal.

Class of Coal—Gas (?)

	Per cent.	Per cent.
Volatile matters—		
Gas, tar, &c.	35·55	
Sulphur	0·32	
Water at 212 degs. Fahr...	7·00	
		42·87
Coke—		
Fixed carbon	53·79	
Sulphur	0·38	
Ash	2·96	
		57·13
		100·00

Notes.

LANARK.

Shawfield Splint Coal—*cont.*

Coke (dry) per ton of coal, 1,280 lb., or 11 cwt. 1 qr. 20 lb.

Analysis of coke (dry)—	Per cent.
Carbonaceous or combustible matter ..	94·15
Sulphur	0·67
Ash	5·18
	100·00
Specific gravity of coal	1·287
Weight of 1 cubic foot in pounds ..	80 lb.
Gas per ton of coal at 60 degs. Fahr. and 30 in. barometer	94·55 cubic feet
Illuminating power in standard sperm candles by union jet consuming 5 cubic feet per hour at 0·5 in. pressure.. ..	16·50 candles
Value of 1 cubic foot of gas in sperm ..	396 grains
Equivalent of a ton of coal in sperm ..	535 lb.
Durability of 1 cubic foot of gas by 5 in. flame..	40 min. 30 sec.
Specific gravity of the gas (air 1·000) ..	·458

The sample consisted of a truck load weighing 5 tons 8 cwt., of which 4 tons 16 cwt. were used in the trial. By Sugg's London Argand —as used in English gasworks for testing gas—the illuminating power was found to be 19·22 candles, equal to 461 grains of sperm per cubic foot of gas, and to 622 lb. of sperm per ton of coal. The coke is of excellent quality as regards both sulphur and ash.

Analyst— . . . . . .

Date of Analysis— . . . . . .

Colliery—CLYDE, ... Seam, ... Pit.

Ell or Household Coal.

Class of Coal—House.

	Per cent.	Per cent.
Volatile matters—		
Gases, tar, &c.	34·76	
Sulphur	0·20	
Water, at 212 degs. Fahr...	9·25	
		44·21
Coke—		
Fixed carbon	53·22	
Sulphur	0·12	
Ash	2·45	
		55·79
		100·00

LANARK.

Notes.

Coke, per ton of coal, 1,250 lb., or ..	11·0·18 cwt.
Composition of the coke (dry) :—	
Carbonaceous or combustible matter	95·40
Sulphur	0·21
Ash	4·39
	100·00
Specific gravity	1·287
Weight of 1 cubic foot	80 lb.
Space required for stowage, per ton ..	42 cubic feet
Heating or evaporating power, practical, in pounds of water at 212 degs., converted into steam by the combustion of 1 lb. of coal	8·01 lb.

The Ell coal in the Hamilton district has long had the reputation of being one of the best household coals obtained in the Scottish coalfields, burning readily, and with a bright cheerful flame, giving only a trifling amount of ash, and being comparatively free from sulphur. The present sample possesses all these qualities, and is particularly adapted for domestic use. Besides being sold locally for household purposes, this coal is largely exported. It is considered one of the best of the first-class Ell or Hartley coals.

Analyst— . . . . . .
Date of Analysis— . . . . . .

Clyde Splint Coal.

Class of Coal—Gas.

Colour, dull brownish black, with brown streak ; fracture, semi-slaty and undulating, with slight deposits of vegetable charcoal ; cross-fracture rather dull, coarse and angular, and partly exhibiting alternate laminæ of bright bituminous and dull coal, as also slight deposits of ferric bisulphide and calcium carbonate ; massive and cohesive, but rather porous ; on the fire it partially and very slightly intumesces ; colour of ash, pinkish white ; thickness of seam, 27 in. ; mean specific gravity, 1·257 (water 1·000) ; weight of 1 cubic foot, 78·57 lb.

		Per cent.
Volatile matters (containing 0·45 of sulphur)		34·04
Coke, consisting of—		
Carbon	55·08	
Sulphur	0·28	
Ash	2·80	
		58·16
Water expelled at 212 degs. Fahr... ..		7·80
		100·00

Notes.

LANARK.

Clyde Splint Coal—*cont.*

Gaseous products—

Gas per ton of coal, at 60 degs. Fahr., and 30 in. bar.	10,615 cubic feet
Gas from 1 cubic foot of the coal	372·28 cubic feet
Specific gravity of the gas	·476 (air 1·000)
Hydrocarbons absorbed by bromine ..	6·50 per cent.
Durability of 1 cubic foot by 5 in. jet flame	44 min. 48 sec.
Value of 1 cubic foot of gas in sperm ..	509·76 grains
Value of gas from 1 ton of coal in sperm..	758·73 lb.
Illuminating power of gas in std. candles	21·24 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·30 per cent.
Carbonic acid (CO_2) in foul gas	2·50 per cent.
Carbonic oxide (CO) in foul gas	8·25 per cent.
Sulphur eliminated with volatile products	10·07 lb.

Liquid products—

Tar per ton of coal	16·30 gallons
Ammoniacal liquor per ton of coal ..	30·20 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal ..	17·47 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	12·00 per cent.

Solid products—

Coke per ton of coal	1,302·78 lb.
Carbon in the coke	95·20 per cent.
Ash in the coke	4·80 per cent.
Sulphur in coke per ton of coal	6·28 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	13·08 lb.

This is an excellent splint coal. It parts with its volatile products speedily at a moderate temperature; yields a considerable amount of illuminating matter, and 11·63 cwt. of first-class coke per ton, and contains at same time a moderate percentage of sulphur, with about the average amount of water. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas), this coal is equal to 57·52.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.

Date of Analysis— . . . . . .

LANARK.

Notes.

Colliery—DOUGLAS PARK, ... Seam, ... Pit.

Clyde Cannel Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

Colour black, with moderate lustre and brown streak; fracture irregular and undulated ; cross-fracture inclining to small conchoidal, with slight deposits of ferric bisulphide in the natural partings; moderately cohesive, but rather porous ; on the fire it decrepitates and flies partially, and very slightly intumesces ; colour of ash, pinkish white ; thickness of seam, 5 to 7½ inches ; mean specific gravity, 1·262 (water 1·000) ; weight of 1 cubic foot, 78·9 lb.

		Per cent.
Volatile matters (containing 0·44 of sulphur)		36·79
Coke consisting of—		
Carbon	52·77	
Sulphur	0·31	
Ash	3·63	
		56·71
Water expelled at 212 degs. Fahr. ..		6·50
		100·00

Gaseous products :—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	10,904 cubic feet
Gas from 1 cubic foot of coal	379·61 cubic feet
Specific gravity of the gas	·520 (air 1·000)
Hydrocarbons absorbed by bromine ..	8·60 per cent.
Durability of 1 cubic foot by 5 in. jet flame	53 min. 40 sec.
Value of 1 cubic foot of gas in sperm ..	620·40 grains
Value of gas from 1 ton of coal in sperm ..	966·40 lb.
Illuminating power of gas in standard candles	25·85 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·30 per cent.
Carbonic acid (CO_2) in foul gas	3·00 per cent.
Carbonic oxide (CO) in foul gas	7·10 per cent.
Sulphur eliminated with volatile products	9·92 lb.
Liquid products :—	
Tar per ton of coal	18·80 gallons
Ammoniacal liquor per ton of coal ..	25·10 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal ..	14·56 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	10·10 per cent.

Notes.

LANARK.

Clyde Cannel Coal—*cont.*

Solid products :—

Coke per ton of coal	1,260·20 lb.
Carbon in the coke	93·60 per cent.
Ash in the coke	6·40 per cent.
Sulphur in coke per ton of coal	6·88 lb.
Heating power of 1 lb. of coke (water from boiling point into steam).. .. .	12·86 lb.

This is an excellent coal for the production of both gas and coke, as in addition to yielding a considerable volume of good gas, it affords 11 cwt. of first-class coke, and contains a moderate amount of sulphur. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 68·38.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.

Date of Analysis— . . . . . .

Douglas Park Splint Coal.

Class of Coal—Gas.

	Per cent.	Per cent.
Volatile matters—		
Gas, tar, &c.	34·88	
Sulphur	0·24	
Water at 212 degs. Fahr. ..	5·06	
		40·18
Coke—		
Fixed carbon..	55·08	
Sulphur	0·36	
Ash	4·38	
		59·82
		100·00

Coke (dry) per ton of coal—1,340 lb., or 11 cwt. 3 qr. 24 lb.

Analysis of the coke (dry)—	Per cent.
Carbonaceous or combustible matter	92·08
Sulphur	0·60
Ash	7·32
	100·00

Specific gravity of the coal	1·271
Weight of 1 cubic foot	79 lb.

LANARK.

Notes.

Gas per ton of coal at 60 degs. Fahr., and 30 in. bar...	10,425 cubic feet
Illuminating power in standard sperm candles, by union jet, consuming 5 cubic feet per hour at 0·5 in. pressure..	20·26 candles
Value of 1 cubic foot of gas in sperm	486 grains
Equivalent of a ton of coal in sperm	724 lb.
Durability of 1 cubic foot of gas by 5 in. flame	48 min. 12 sec.
Gravity of the gas (air 1·000)	·475

The sample weighed 6 tons 3 cwt., and 5 tons 8 cwt. were used in the trial. By Sugg's London Argand, as employed in English gas-works, the gas had an illuminating power of 22·23 candles, equal to 533 grains of sperm per cubic foot, and to 794 lb. of sperm per ton of coal. The coke is of excellent quality.

These "splint" coals are used in the principal iron and steel and other works in the vicinity of the collieries. They are also shipped to foreign markets, especially to South America, with the best results.

Analyst— . . . . .
Date of Analysis— . . . . .

Colliery—WELLHALL (?) . . . . . Seam, ... Pit

Wellhall Cannel Coal.

Class of Coal—Gas.

The coal is black and possesses high lustre and brown streak; fracture irregular, and partly inclining to scalariform, with impressions of stigmaria; cross-fracture, conchoidal, with deposits of calcium carbonate and ferric bisulphide in the natural partings; moderately compact and cohesive; on the fire it intumesces and agglomerates; colour of ash, pale yellow and flocculent; thickness of seam, 6 to 7½ inches; mean specific gravity, 1·233 (water 1·000); weight of 1 cubic foot, 77·06 lb.

		Per cent.
Volatile matters (containing 0·38 of sulphur)		43·85
Coke, consisting of—		
Carbon	46·66	
Sulphur	0·16	
Ash	2·68	
	——	49·50
Water expelled at 212 degs. Fahr. ..		6·65
		100·00

Notes.

LANARK.

Wellhall Cannel Coal—*cont.*

Gaseous products—

Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	11,225 cubic feet
Gas from 1 cubic foot of the coal	386·16 cubic feet
Specific gravity of the gas	·646 (air 1·000)
Hydrocarbons absorbed by bromine ..	11·25 per cent.
Durability of 1 cubic foot by 5 in. jet flame	60 min. 18 sec.
Value of 1 cubic foot of gas in sperm ..	710·88 grains
Value of gas from 1 ton of coal in sperm	1,138·25 lb.
Illuminating power of gas in standard candles	29·62 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·20 per cent.
Carbonic acid (CO_2) in foul gas	2·75 per cent.
Carbonic oxide (CO) in foul gas	11·25 per cent.
Sulphur eliminated with volatile products	8·50 lb.

Liquid products—

Tar per ton of coal	20·72 gallons
Ammoniacal liquor, per ton of coal ..	27·50 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal ..	14·86 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	9·20 per cent.

Solid products :—

Coke per ton of coal	1,108·8 lb.
Carbon in the coke	94·60 per cent.
Ash in the coke	5·40 per cent.
Sulphur in coke per ton of coal	3·59 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	12·99 lb.

This coal is very easily distilled, yields a considerable volume of 29·65-candle gas, and, at same time, affords well nigh 10 cwt. first-class coke. The percentage of sulphur is also very moderate. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas) this coal is equal to 79·71.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.

Date of Analysis— . . . . . .

LANARK. *Notes.*

WISHAW COAL COMPANY LIMITED,

Motherwell.

Collieries—DALZELL AND BROOMSIDE, ... Seam, ... Pit.

Shipping Ports—Glasgow, Greenock, Leith, Grangemouth, Ardrossan.

Rail—Caledonian, Motherwell Station.

Canal— . . . . . .

Broomside Cannel Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave, on examination, the following results:—

Colour black, with moderate lustre and brownish streak. Fracture inclining to slaty and partly undulated. Cross-fracture slightly conchoidal, and exhibiting in natural partings slight deposits of calcium carbonate and pyrites; moderately cohesive and massive, but rather porous. On the fire it decrepitates and flies, but does not intumesce nor agglomerate; colour of ash, white; thickness of seam, 20 in., and well defined; mean specific gravity, 1·287 (water 1·000); weight of 1 cubic foot, 80·44 lb.

		Per cent.
Volatile matters (containing 0·43 of sulphur)		35·93
Coke, consisting of—		
Carbon	51·01	
Sulphur	0·25	
Ash	6·11	
		57·37
Water expelled at 212 degs. Fahr. ..		6·70
		100·00

Gaseous products:—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	10,521 cubic feet
Gas from 1 cubic foot of the coal	377·77 cubic feet
Specific gravity of the gas	·491 (air 1·000)
Hydrocarbons absorbed by bromine ..	8·75 per cent.
Durability of 1 cubic foot by 5 in. jet flame	50 min. 10 sec.
Value of 1 cubic foot of gas in sperm ..	584·64 grains
Value of gas from 1 ton of coal in sperm..	878·71 lb.
Illuminating power of gas in standard candles	24·36 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·60 per cent.
Carbonic acid (CO_2) in foul gas	2·50 per cent.
Carbonic oxide (CO) in foul gas	5·00 per cent.
Sulphur eliminated with volatile products	9·63 lb.

Notes.

LANARK.

Broomside Cannel Coal—*cont.*

Liquid products :—

Tar per ton of coal	19·35 gallons
Ammoniacal liquor per ton of coal ..	25·50 gallons
Strength of ammoniacal liquor	3·00 degs. Twadd.
Hygrometric water per ton of coal ..	15·00 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	10·30 per cent.

Solid products :—

Coke per ton of coal	1,285·08 lb.
Carbon in the coke	89·36 per cent.
Ash in the coke	10·64 per cent.
Sulphur in coke per ton of coal	5·60 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	12·27 lb.

The foregoing results compare favourably with those from the best cannels from the Lanarkshire Splint seam. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 63·13.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.
Date of Analysis—May 17, 1888.

WOODSIDE COAL COMPANY LIMITED,

Netherburn, by Hamilton.

Colliery—WOODSIDE, Virtuewell Seam, No. 2 Pit.
Shipping Ports—Scottish ports, principally Glasgow.
Rail—Caledonian, Motherwell Station.
Canal—None.

Woodside Virtuewell Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

The coal is black, possesses moderate lustre and brown streak; fracture, irregular to regular, and in part alternately laminated with splint and bituminous coal, and containing thin deposits of charcoal and some impressions of stigmaria. Cross-fracture, angular to cubical and resinoid, with deposits of calcium carbonate and ferric bisulphide. Under distillation it intumesces and agglomerates. Colour of ash, brown. Moderately cohesive but rather porous. Thickness of seam, 26 in.; mean specific gravity, 1·218 (water 1·000); weight of 1 cubic foot, 76·16 lb.

Notes.

LANARK.

		Per cent.
Volatile matters (containing 0·55 of sulphur)		36·24
Coke, consisting of—		
Carbon	54·38	
Sulphur	0·12	
Ash	1·98	
		56·48
Water expelled at 212 degs. Fahr.		7·28
		100·00
Gaseous products—		
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.		11,610 cubic feet
Gas from 1 cubic foot of the coal		394·74 cubic feet
Specific gravity of the gas		·486 (air 1·000)
Hydrocarbons absorbed by bromine ..		6·00 per cent
Durability of 1 cubic foot by 5 in. jet flame		44 min. 26 sec.
Value of 1 cubic foot of gas in sperm ..		468·48 grains
Value of gas from 1 ton of coal in sperm..		777·01 lb.
Illuminating power of gas in standard system (per London Argand)		19·52 candles
Sulphuretted hydrogen (H_2S) in foul gas..		1·50 per cent.
Carbonic acid (CO_2) in foul gas		2·50 per cent.
Carbonic oxide (CO) in foul gas		7·75 per cent.
Sulphur eliminated with volatile products		12·32 lb.
Liquid products—		
Tar per ton of coal		16·60 gallons
Ammoniacal liquor per ton of coal ..		28·52 gallons
Strength of ammoniacal liquor		2·50 degs. Twadd.
Hygrometric water per ton of coal ..		16·30 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..		10·68 per cent.
Solid products—		
Coke per ton of coal		1,265·15 lb.
Carbon in the coke		96·50 per cent.
Ash in the coke		3·50 per cent.
Sulphur in coke per ton of coal		2·68 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)		13·25 lb.

Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 1,300 ft. of gas, and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas) this coal is equal to 58·88.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.

Date of Analysis—January 31, 1902.

Notes.

LINLITHGOW.

GAVIN PAUL AND SONS LIMITED,

14, Torpichen Street, Edinburgh.

Colliery—RIDDOCHHILL, Main Seam, Riddochhill Pit.
Shipping Ports—On Forth (south side).
Rail—North British, Bathgate Station.
Canal—None.

Riddochhill Gas Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The seam consists of semi-splint and bituminous coal, and in colour black with considerable lustre and brown streak. In fracture the splint portion separates into thin plates or foliations by fine deposits of vegetable charcoal, while the more bituminous portion possesses an irregular fracture and cubical cross-fracture, with deposits of calcic carbonate and ferric bisulphide; moderately cohesive and compact; on the fire it intumesces and agglomerates; colour of ash, pale yellow; thickness of seam 60 in.; mean specific gravity, 1·280 (water 1·000); weight of 1 cubic foot, 80·0 lb.

		Per cent.
Chemical analysis—		
Volatile matter (containing 0·42 of sulphur)		33·83
Coke, consisting of—		
Carbon	55·69	
Sulphur	0·26	
Ash	2·72	
		58·67
Water expelled at 212 degs. Fahr.		7·50
		100·00
Gaseous products—		
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.		10,630 cubic feet
Gas from 1 cubic foot of the coal		379·64 cubic feet
Specific gravity of the gas		·496 (air 1·000)
Hydrocarbons absorbed by bromine ..		5·75 per cent.
Durability of 1 cubic foot by 5 in. jet flame		45 min. 9 sec.
Value of 1 cubic foot of gas in sperm ..		516·24 grains
Value of gas from 1 ton of coal in sperm ..		783·95 lb.
Illuminating power of gas in standard candles (per London Argand)		21·51 candles
Sulphuretted hydrogen (H_2S) in foul gas		1·33 per cent.
Carbonic acid (CO_2) in foul gas		2·80 per cent.
Carbonic oxide (CO) in foul gas		6·25 per cent.
Sulphur eliminated with volatile products		9·39 lb.

Notes.

LINLITHGOW.

Liquid products :—	
Tar per ton of coal	13·80 gallons
Ammoniacal liquor per ton of coal ..	31·50 gallons
Strength of ammoniacal liquor	2·00 degs. Twadd.
Hygrometric water per ton of coal ..	16·80 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	10·80 per cent.
Solid products—	
Coke per ton of coal	1,314·20 lb.
Carbon in the coke	95·20 per cent.
Ash in the coke	4·80 per cent.
Sulphur in coke per ton of coal	5·84 lb
Heating power of 1 lb. of coke (water from boiling point into steam)	12·98 lb.

While giving a good average yield of 21½-candle gas, this coal affords about 11¾ cwt. of first-class coke. It, at same time, contains a moderate percentage of sulphur, with about the average amount of water. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 56·85.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.
Date of Analysis—May 4, 1892.

Colliery—BOGHEAD, Balbardie Seam, Boghead Pit.

Boghead Cannel Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results :—

The coal is brownish-black, possesses moderate lustre and yellowish-brown streak ; fracture irregular, inclining to slaty, with impressions of stigmaria ; cross-fracture large conchoidal and partly hackly, with slight deposits of calcic carbonate and ferric bisulphide in the natural partings ; compact and cohesive ; under distillation it partly and slightly intumesces ; colour of ash, brownish-white ; thickness of seam, 10 in. ; mean specific gravity, 1·307 (water 1·000) ; weight of 1 cubic foot, 81·68 lb.

		Per cent.
Volatile matters (containing 0·44 of sulphur)		46·27
Coke, consisting of—		
Carbon	43·44	
Sulphur	0·13	
Ash	7·82	
		51·39
Water expelled at 212 degs. Fahr.		2·34
		100·00

Notes.

LINLITHGOW.

Boghead Cannel Coal—*cont.*

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	13,640 cubic feet
Gas from 1 cubic foot of the coal	497·37 cubic feet
Specific gravity of the gas	·617 (air 1·000)
Hydrocarbons absorbed by bromine ..	13·25 per cent.
Durability of 1 cubic foot by 5 in. jet flame	68 min. 18 sec.
Value of 1 cubic foot of gas in sperm ..	848·16 grains
Value of gas from 1 ton of coal in sperm..	1,681·27 lb.
Illuminating power of gas in standard candles	35·34 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·25 per cent.
Carbonic acid (CO_2) in foul gas	2·20 per cent.
Carbonic oxide (CO) in foul gas	11·75 per cent.
Sulphur eliminated with volatile products	9·85 lb.
Liquid products—	
Tar per ton of coal	26·40 gallons
Ammoniacal liquor per ton of coal	9·20 gallons
Strength of ammoniacal liquor	3·75 degs. Twadd.
Hygrometric water per ton of coal ..	5·24 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	2·76 per cent.
Solid products—	
Coke per ton of coal..	1,151·13 lb.
Carbon in the coke	84·80 per cent.
Ash in the coke	15·20 per cent.
Sulphur in coke per ton of coal	2·91 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	11·65 lb.

This is a very rich cannel coal, and therefore one of great value for ordinary coal gas enrichment; under distillation it parts with its volatile products very speedily, yielding a large volume of 35·34-candle gas, and at same time affords 10·27 cwt. of coke of medium quality per ton. The foul gas, moreover, contains a very small percentage of impurities. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 110·96.

Analyst—Geo. R. Hislop, F.C.S., M.S.C.Ind., F.R.S.S.A.
Date of Analysis—March 12, 1900.

Notes.

STIRLINGSHIRE.

ROBERT ADDIE AND SONS' COLLIERIES LIMITED,

127, St. Vincent Street, Glasgow.

Colliery—HERBERTSHIRE, Steam and Smithy Seam, Nos. 2 and 3 Pits.

Shipping Ports—Glasgow, Greenock, Grangemouth, Bo'ness, Leith, and Dundee.

Rail—Caledonian, Denny Station.

Canal—None.

Herbertshire Navigation Coal.

Class of Coal—Steam.

Proximate analysis—

	Per cent.	Per cent.
Volatile matters—		
Gas, tar, &c.	20·30	
Sulphur	0·30	
Water at 212 degs. Fahr. ..	1·28	
	——	21·88
Coke—		
Fixed carbon	73·71	
Sulphur	0·39	
Ash	4·02	
	——	78·12
		100·00

Coke per ton of coal, 1,750 lb., or 15 cwt. 2 qrs. 14 lb.

Specific gravity	1·293
Weight of 1 cubic foot	80½ lb.
Space required for stowage, per ton	41½ cubic feet

Composition of the coke, dry—	Per cent.
Carbonaceous or combustible matter	94·35
Sulphur	0·50
Ash	5·15
	100·00

Ultimate analysis—	Per cent.
Carbon	81·64
Hydrogen	4·99
Oxygen	6·04
Nitrogen	1·34
Sulphur	0·69
Ash	4·02
Water at 212 degs. Fahr. ..	1·28
	100·00

Notes.

STIRLINGSHIRE.

Herbertshire Navigation Coal—*cont.*

Heating or calorific power absolute (water at 212 degs. Fahr., converted into steam by 1 lb. of coal)	14·90 lb.
Heating power, practical..	10·21 lb.

This is a steam coal of very fine quality, and is specially adapted for firing the boilers of steamships, as it possesses a very high heating power, while it gives comparatively little flame and scarcely any smoke. The sulphur and ash are both very moderate, and in respect to these it compares favourably with the best description of Welsh and Newcastle coals. It is less friable than most coals of equally high heating power; it does not break or splinter in the fire, and it possesses the quality of coking or caking to a considerable extent.

Analyst—William Wallace, F.R.S.E., F.C.S., F.I.C.

Date of Analysis— . . . . . .

Herbertshire Smithy Coal.

Class of Coal—Manufacturing (?).

	Per cent.	Per cent.
Volatile matters—		
Gas, tar, &c.	21·40	
Sulphur	0·40	
Water	1·60	
	——	23·40
		Per cent.
Volatile matters		23·40
Coke—		
Fixed carbon	73·10	
Sulphur	0·40	
Ash	3·10	
	——	76·60
		100·00
Specific gravity		1·30
Weight of a cubic foot		81·25 lb.

This is a high-class smithy coal, and is extremely well adapted for its purpose. Its heating power is very high, it cakes well together, and makes an excellent hollow fire which is very lasting.

Analyst—R. R. Tatlock, F.R.S.E., F.C.S.

Date of Analysis—May 11, 1886.

STIRLINGSHIRE.

Notes.

ALLOA COAL COMPANY LIMITED,

Alloa.

Collieries—BANNOCKBURN and CARNOCK, Hartley and Wallsend Seams, Nos. 1, 2 and 3 Bannockburn, and Nos. 1 and 2 Carnock Pits.

Shipping Ports—Glasgow, Greenock, Grangemouth, Bo'ness, Leith, Dundee, Alloa.

Rail—Caledonian, Plean Station.

Canal—None.

Bannockburn Wallsend Drawing-room Coal.

Class of Coal—House.

The coal is black and of high lustre, while in fracture it is irregular, and in cross-fracture columnar and highly crystalline in structure, and of very uniform composition and density; mean specific gravity, 1·237 (water 1·000); weight of 1 cubic foot, 77·31 lb. It is moderately cohesive, but very compact and without a trace of lime or pyritic impurities.

	Per cent.
Volatile matters	29·10
Fixed carbon	66·50
Ash	2·10
Sulphur	0·05
Water	2·25
	100·00

Heating power of the coal as determined by Thomson's calorimeter:—1 lb. of the coal by perfect combustion evolves heat sufficient to convert 14·85 lb. of water from 212 degs. Fahr. into steam.

It contains exceptionally small percentages of ash, water and sulphur, possesses great heating power, durability and freedom from smoke, and is therefore an exceptionally fine drawing-room coal.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.

Date of Analysis—December 22, 1894.

Notes.

STIRLINGSHIRE.

Bannockburn Coking Gas Coal.

Class of Coal—Gas.

The coal is black, possesses high lustre and brown streak; fracture generally defined by laminæ of charcoal, while cross-fracture is angular and highly crystalline to semi-resinoid with trace only of calcium carbonate; moderately cohesive but compact; on the fire it largely intumesces and agglomerates; ash, pale brown and flocculent; thickness of seam, 25 in., and of very uniform density; mean specific gravity, 1·275 (water 1·000); weight of 1 cubic foot, 79·68 lb.

		Per cent.
Volatile matters (containing 0·33 of sulphur)		32·10
Coke, consisting of—		
Carbon	60·86	
Sulphur	0·21	
Ash	3·08	
		64·15
Water expelled at 212 degs. Fahr... ..		3·75
		100·00

Gaseous products:—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	11,632 cubic feet
Gas from 1 cubic foot of the coal	414·70 cubic feet
Specific gravity of the gas	·511 (air 1·000)
Hydrocarbons absorbed by bromine ..	6·00 per cent.
Durability of 1 cubic foot by 5 in. jet flame	43 minutes
Value of 1 cubic foot of gas in sperm ..	524·16 grains
Value of gas from 1 ton of coal in sperm..	871·00 lb.
Illuminating power of gas in standard candles { per London Argand	21·84 candles
candles { per Union jet	18 candles
Sulphuretted hydrogen (H_2S) in foul gas	·75 per cent.
Carbonic acid (CO_2) in foul gas	2·20 per cent.
Carbonic oxide (CO) in foul gas	5·25 per cent.
Sulphur eliminated with volatile products	7·55 lb.
Liquid products:—	
Tar per ton of coal	12·12 gallons
Ammoniacal liquor per ton of coal ..	15·27 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal ..	8·40 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	4·25 per cent.

STIRLINGSHIRE.

Notes.

Solid products:—

Coke per ton of coal..	1,436·96 lb.
Carbon in the coke	95·20 per cent.
Ash in the coke	4·80 per cent.
Sulphur in coke per ton of coal	4·54 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	13·08 lb.

This is an excellent coal, and for the production of gas and coke it is without one detracting property. It yields a large volume of 21·84-candle gas, and affords 12·83 cwt. of remarkably good coke, while the percentages of water and sulphur in it are very moderate. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas), this coal is equal to 63·18 per cent.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.

Date of Analysis—November 10, 1894.

BANKNOCK COAL COMPANY,

142, West Nile Street, Glasgow.

Colliery—BROOMRIGG, Splint Seam, Bonnyrigg Pit.

Shipping Ports—Bo'ness, Grangemouth, South Alloa.

Rail—North British and Caledonian, Bonnybridge Central Station.

Canal—Forth and Clyde Canal.

Banknock Gas Splint Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal is black to brownish black, the seam consisting of 7 in. bituminous coal and 18 in. of hard splint, and fracture irregular to slaty, with deposits of charcoal; cross-fracture cubical and resinoid with considerable lustre to angular, with deposits of calcic carbonate and ferric bisulphide in the natural partings; moderately cohesive and compact; on the fire it intumesces and agglomerates; colour of ash, pale brown; mean specific gravity 1·272 (water, 1·000); weight of 1 cubic foot, 79·5 lb.

		Per cent.
Volatile matters (containing 0·39 of sulphur)		34·31
Coke, consisting of—		
Carbon	55·73	
Sulphur	0·23	
Ash	3·58	
		59·54
Water expelled at 212 degs. Fahr. ..		6·15
		100·00

Notes.

STIRLINGSHIRE.

Banknock Gas Splint Coal—*cont.*

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar	10,930 cubic feet
Gas from 1 cubic foot of the coal	387·91 cubic feet
Specific gravity of the gas	·536 (air 1·000)
Hydrocarbons absorbed by bromine ..	6·30 per cent.
Durability of 1 cubic foot by 5 in. jet flame	43 min. 16 sec.
Value of 1 cubic foot of gas in sperm ..	517·20 grains
Value of gas from 1 ton of coal in sperm..	807·57 lb.
Illuminating power of gas in standard candles (per London Argand)	21·55 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·20 per cent.
Carbonic acid (CO_2) in foul gas	2·80 per cent.
Carbonic oxide (CO) in foul gas	9·00 per cent.
Sulphur eliminated with volatile products	8·73 lb.
Liquid products—	
Tar per ton of coal	14·20 gallons
Ammoniacal liquor per ton of coal ..	23·17 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal ..	13·77 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	8·09 per cent.
Solid products—	
Coke per ton of coal	1,333·69 lb.
Carbon in the coke	94·00 per cent.
Ash in the coke	6·00 per cent.
Sulphur in coke per ton of coal	5·15 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	12·91 lb.

This is an excellent splint for gas-making purposes, as in addition to yielding a considerable volume of 21·55 standard candles, it affords nearly 12 cwt. of excellent residual coke, while the foul gas contains a moderate percentage of impurities. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas) this coal is equal to 58·24.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.

Date of Analysis—March 14, 1896.

Notes.

STIRLINGSHIRE.

Colliery—BROOMRIGG, Jewel Seam, Broomrigg Pit.

Shipping Ports—Grangemouth, Bo'ness, South Alloa.

Rail—North British and Caledonian, Dennyloanhead Station.

Canal—Forth and Clyde Canal.

Banknock Jewel Coal.

Class of Coal—Gas and House.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal is black, and of considerable lustre; fracture, chiefly irregular but partly laminated with deposits of charcoal; cross-fracture, angular to cubical and largely resinoid, with slight deposits of calcic carbonate in the natural partings; moderately cohesive and compact; under distillation it intumesces and agglomerates; ash, pale brown and flocculent; thickness of seam, 42 in., and of very uniform density. Mean specific gravity 1·228 (water 1·000). Weight of 1 cubic foot, 76·75 lb.

		Per cent.
Volatile matters (containing 0·17 of sulphur)		32·79
Coke, consisting of—		
Carbon	58·11	
Sulphur	0·17	
Ash	2·18	
		60·46
Water expelled at 212 degs. Fahr... ..		6·75
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	10,750 cubic feet
Gas from 1 cubic foot of the coal	368·33 cubic feet
Specific gravity of the gas	·480 (air 1·000)
Hydrocarbons absorbed by bromine ..	4·60 per cent.
Durability of 1 cubic foot by 5 in. jet flame	42 min. 16 sec.
Value of 1 cubic foot of gas in sperm ..	437·28 grains
Value of gas from 1 ton of coal in sperm..	671·53 lb.
Illuminating power of gas in standard candles (per London Argand)	18·22 candles
Sulphuretted hydrogen (H_2S) in foul gas	0·66 per cent.
Carbonic acid (CO_2) in foul gas	5·25 per cent.
Carbonic oxide (CO) in foul gas	6·75 per cent.
Sulphur eliminated with volatile products	5·82 lb.

Notes.

STIRLINGSHIRE.

Banknock Jewel Coal—*cont.*

Liquid products—

Tar per ton of coal	11·50 gallons
Ammoniacal liquor per ton of coal ..	27·20 gallons
Strength of ammoniacal liquor	3·25 degs. Twadd.
Hygrometric water per ton of coal ..	15·12 gallons
Aqueous absorbent capacity of coal (determined by complete saturation) ..	8·30 per cent.

Solid products—

Coke per ton of coal	1,354·30 lb.
Carbon in the coke	96·40 per cent.
Ash in the coke	3·60 per cent.
Sulphur in the coke per ton of coal ..	3·81 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	13·24 lb.

This is an excellent splint for gas-making purposes, as in addition to yielding a considerable volume of 21·55 standard candles, it affords nearly 12 cwt. of excellent residual coke, while the foul gas contains a moderate percentage of impurities. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas), this coal is equal to 48·34.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.

Date of Analysis—May 12, 1898.

Colliery—BROOMRIGG, Kiltongue Seam, No. 3 Pit.

Shipping Ports—Bo'ness, Grangemouth, South Alloa.

Rail—K. and B. Railway, ... Station.

Canal—None.

Banknock Diamond Coking Coal.

Class of Coal—Coking.

A sample of this coal gave on examination the following results :—The coal is black, possesses high lustre and brown streak ; fracture defined by deposits of charcoal ; cross-fracture angular, and highly resinoid, with deposits of calcic carbonate, and slight deposits of ferric bisulphide in the natural partings ; moderately cohesive and compact under distillation ; it intumesces and agglomerates ; colour of ash, pale brown ; thickness of seam, 28 in. ; mean specific gravity, 1·280 (water 1·000) ; weight of 1 cubic foot, 80·0 lb.

STIRLINGSHIRE.

Notes.

		Per cent.
Volatile matters (containing 0·35 of sulphur)		33·18
Coke, consisting of—		
Carbon	56·41	
Sulphur	0·17	
Ash	3·62	
		60·20
Water expelled at 212 degs. Fahr. ..		6·62
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar.	11,245 cubic feet
Gas from 1 cubic foot of the coal	401·60 cubic feet
Specific gravity of the gas	·496 (air 1·000)
Hydrocarbons absorbed by bromine ..	5·50 per cent.
Durability of 1 cubic foot by 5 in. jet flame	46 min. 18 sec.
Value of 1 cubic foot of gas in sperm ..	514·08 grains
Value of gas from 1 ton of coal in sperm	825·83 lb.
Illuminating power of gas in standard candles (per London Argand)	21·42 candles
Sulphuretted hydrogen (H_2S) in foul gas	1·50 per cent.
Carbonic acid (CO_2) in foul gas	3·50 per cent.
Carbonic oxide (CO) in foul gas	7·00 per cent.
Sulphur eliminated with volatile products	12·32 lb.
Liquid products—	
Tar per ton of coal	13·20 gallons
Ammoniacal liquor per ton of coal ..	24·57 gallons
Strength of ammoniacal liquor	2·50 degs. Twadd.
Hygrometric water per ton of coal ..	14·82 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	9·80 per cent.
Solid products—	
Coke per ton of coal	1,348·48 lb.
Carbon in the coke	94·00 per cent.
Ash in the coke	6·00 per cent.
Sulphur in coke per ton of coal	3·80 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	12·91 lb.

This is an excellent gas and coking coal, yielding as it does of the former, a considerable volume of high quality; and of the latter, 12 cwt. per ton of the first class. The coal at same time contains moderate amounts of sulphur and water. Compared with the Main Lesmahagow

Notes.

STIRLINGSHIRE.

Banknock Diamond Coking Coal—*cont.*

cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm value per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this coal is equal to 58·21.

Analyst—Geo. R. Hislop, F.C.S., M.S.C.Ind., F.R.S.S.A.
Date of Analysis—February 6, 1904.

CARMUIR COAL COMPANY LIMITED,

21, Bothwell Street, Glasgow.

Colliery—CARMUIR, Gas Coal Coking Seam, No. 1 Pit.
Shipping Ports—Grangemouth, Bo'ness.
Rail—North British and Caledonian, Larbert Station.
Canal—None.

Carmuir Gas Coal.

Class of Coal—Gas.

A sample of this coal, representing the full section of the seam, gave, on examination, the following results;—

	Per cent.
Volatile matters	34·04
Coke	59·61
Water	6·35
Specific gravity of the coal	1·242 (water 1·000)
Weight of 1 cubic foot	77·62 lb.
Gas per ton of coal at 60 degs. Fahr. and 30 in. bar...	11,810 cubic feet
Illuminating power of the gas	22·07 std. candles
Value of gas per ton in sperm	893·64 lb.
Coke per ton of coal	1,335·26 lb.
Carbon in the coke	97·00 per cent.
Ash in the coke	3·00 per cent.
Sulphuretted hydrogen in foul gas	1·25 per cent.
Carbonic acid in foul gas..	4·50 per cent.
Carbonic oxide in foul gas .. .	8·00 per cent.

This is an excellent coal for the production of gas and coke. It is a semi-splint and free coal of foliated fracture with deposits of charcoal pyrites and traces of lime carbonate. The coal affords 11·92 cwt. of remarkably pure coke per ton.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.
Date of Analysis—February 7, 1898.

STIRLINGSHIRE.

Notes

PLEAN COLLIERY COMPANY LIMITED

65, Renfield Street, Glasgow.

Colliery—PLEAN, Bannockburn Seam, ... Pit.

Shipping Ports—Glasgow, Grangemouth, Bo'ness, Methil, Burntisland, Leith.

Rail—Caledonian, Plean Station.

Canal— . . . . .

Plean Smithy Coal Nuts.

Class of Coal—Manufacturing (?)

	Per cent.	Lb. per ton.
Volatile matters	21·83	488·99
Fixed carbon	73·45	1,645·28
Ash	1·90	42·56
Sulphur	0·54	12·10
Water, at 212 degs. Fahr.	2·28	51·07
	100·00	2,240·00
Specific gravity of the nuts	1·208 (water 1·000)	
Weight of 1 cubic foot	7·55 lb.	

Heating power of the nuts as determined by Thomson's calorimeter:—1 lb. of the coal nuts by perfect combustion will generate heat sufficient to convert 14·55 lb. of water from 212 degs. Fahr. into steam.

The nuts are remarkably clean and free from all foreign matters, and in size gauged between the meshes of a $\frac{5}{8}$ and $\frac{3}{8}$ screen, are cubical to rhomboidal in form, and possess considerable lustre; 95·82 per cent. of the coal being purely heat-giving matter, it possesses great heating energy. It contains a very moderate percentage of sulphur and water. In combustion it slightly agglomerates, and leaves a very small amount of brown ash.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A., F.I.Inst.

Date of Analysis—April 4, 1896.

Notes.

STIRLINGSHIRE.

Plean Gas and Coking Coal.

Class of Coal—Gas.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

The coal is black, possesses high lustre, and brownish black streak. Fracture irregular and partly defined by laminæ of resinoid coal. Cross-fracture angular and highly crystalline to resinoid, and exhibiting numerous small bright planes. Moderately cohesive and compact, and of very uniform composition and density. Thickness of seam, 26 in.; mean specific gravity, 1·260 (water 1·000); weight of 1 cubic foot, 78·75 lb.

		Per cent.
Volatile matters (containing 0·24 of sulphur)		26·42
Coke, consisting of—		
Carbon	70·52	
Sulphur	0·14	
Ash	1·59	
		72·25
Water expelled at 212 degs. Fahr. ..		1·33
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	11,525 cubic feet
Gas from 1 cubic foot of the coal	405·18 cubic feet
Specific gravity of the gas	·482 (air 1·000)
Hydrocarbons absorbed by bromine ..	6·20 per cent.
Durability of 1 cubic foot by 5 in. jet flame	40 min. 16 sec.
Value of 1 cubic foot of gas in sperm ..	444·24 grains
Value of gas from 1 ton of coal in sperm..	731·41 lb.
Illuminating power of gas in standard sperm candles (per London Argand) ..	18·51 candles
Sulphuretted hydrogen (H_2S) in foul gas	0·40 per cent.
Carbonic acid (CO_2) in foul gas	1·25 per cent.
Carbonic oxide (CO) in foul gas	7·00 per cent.
Sulphur eliminated with volatile products	5·39 lb.
Liquid products—	
Tar per ton of coal	10·20 gallons
Ammoniacal liquor, per ton of coal ..	5·30 gallons
Strength of ammoniacal liquor ..	3·25 degs. Twadd.
Hygrometric water per ton of coal ..	2·97 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)..	1·55 per cent.

Notes.

STIRLINGSHIRE.

Solid products—

Coke per ton of coal	1,618·40 lb.
Carbon in the coke	97·80 per cent.
Ash in the coke	2·20 per cent.
Sulphur in coke per ton of coal	3·12 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)	13·46

This is an exceptionally fine coal of its class; while yielding a large volume of 18½-candle gas, it affords 14·45 cwt. of remarkably pure coke per ton, and the percentage of impurities in the foul gas is about the lowest I have found in any coal. Compared with Main Lesmahagow cannel coal represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas, and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas), this coal is equal to 58·44.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A., F.I.Inst.

Date of Analysis—August 28, 1895.

ARCHIBALD RUSSELL LIMITED,

68, Great Clyde Street, Glasgow.

Colliery—POLMAISE, ... Seam, Nos. 1 and 2 Pits.
Shipping Ports—Glasgow, Grangemouth, Bo'ness, Leith.
Rail—Caledonian, Stirling Station.
Canal—None.

Polmaise Navigation Coal.

Class of Coal—Steam.

	Per cent.	Per cent.
Volatile matter—		
Gas, tar, &c.	18·02	
Sulphur	0·14	
Water	1·84	
		20·00
Coke—		
Fixed carbon	76·74	
Sulphur	0·56	
Ash	2·70	
		80·00
		100·00

Notes.

STIRLINGSHIRE.

Polmaise Navigation Coal—*cont.*

Specific gravity	1·27
Weight of 1 cubic foot	79·37 lb.
Heating power, practical, Playfair's formula (water at 212 degs. Fahr. evaporated by 1 lb. of coal)	10·53 lb.

The analysis shows that this is a steam or navigation coal of first-class quality. It contains only a moderate amount of sulphur and is very free from ash, and in these respects the coal could hardly be surpassed.

Analysts—R. R. Tatlock and Thomson.

Date of Analysis—March 2, 1904.

Polmaise Anthracite Coal.

Class of Coal—Smokeless, Steam, Manufacturing.

Specific gravity	1·332
Moisture	2·75 per cent.
Composition of dry coal—	Per cent.
Carbon	87·30
Hydrogen	4·05
Sulphur	0·10
Oxygen and nitrogen	4·65
Mineral ash	3·90
	100·00
Volatile matter expelled at 1,000 degs. Cent. in one hour, reckoned on the dry coal ..	12·72 per cent.
Fixed carbon, reckoned on the dry coal ..	83·3 per cent.

Calorific power of dry coal—

(*a*) Burnt in a Berthelot-Mahler bomb calorimeter, with oxygen under pressure, the coal (dry coal) yielded 8·270 grm. Centigrade units per gram., or 14·880 B.T.U. per lb.

(*b*) If the steam produced during combustion were not condensed, the calorific value of the coal would be 8·048 grm. Centigrade units per gram., or 14·490 B.T.U. per lb.

The coal was a non-caking variety, of high calorific value, and it yielded a highly pulverulent coke. The ash was of a light buff colour, almost free from iron compounds. The coal contains a very minute quantity of arsenic, which is wholly "volatile." The quantity, however, is so small that it is scarcely possible to estimate it very accurately; it amounts to something between 1 part in 33,000, and 1 part in 50,000. The ash which remains when the coal is burnt is absolutely free from arsenic.

Analyst—William A. Bone, D.Sc., Ph.D.

Date of Analysis—April 26, and October 27, 1904.

WALES

Notes.

CARMARTHEN.

AMMANFORD COLLIERY COMPANY,

Ammanford, R.S.O.

Colliery—AMMANFORD, Little Vein Seam, Little Vein Slant.
Shipping Ports—Swansea, Llanelly, Port Talbot.
Rail—Great Western and L. and N. W., Ammanford Station.
Canal— . . . . . .

Little Vein Anthracite.

Class of Coal—Anthracite, Suction, Gas.

	Per cent.
Carbon	92·09
Hydrogen	3·54
Oxygen and nitrogen	1·96
Sulphur	0·94
Ash	1·47
	100·00
Moisture	0·39

Analyst—Norman Tate.
Date of Analysis— . . . . . .

BLAINA COLLIERY LIMITED,

2, Gloucester Place, Swansea.

Colliery—BLAINA, ... Seam, ... Pit.
Shipping Ports—Swansea, Llanelly.
Rail—Great Western, Pantyffynnon Station.
Canal— . . . . . .

Stanllyd Vein Anthracite Coal.

Class of Coal—Anthracite.

The coal dried at 100 degs. Cent. gave the following :—

	Per cent.
Volatile matter	5·09
Ash	1·15
Fixed carbonaceous matter	93·76
	100·00

Notes.

CARMARTHEN.

Stanllyd Vein Anthracite Coal—*cont.*

The composition of the dried sample was as follows:—

	Per cent.
Carbon	92·53
Hydrogen	3·61
Oxygen and nitrogen	1·96
Sulphur	0·75
Ash	1·15
	100·00

The sample was free from arsenic.

Analysts—Hy. A. Penrose and Co.

Date of Analysis—October 22, 1902.

CAEPONTBREN COLLIERY COMPANY LIMITED,

Kidwelly.

Colliery—CAEPONTBREN, Green Vein Seam, Caepontbren Pit.

Shipping Ports—Burry Port, Swansea.

Rail—Burry Port and Gwendraeth Valley, Great Western, Burry Port Station.

Canal—*Nil.*

Anthracite Coal.

Class of Coal—Anthracite.

	Per cent.
Carbon	92·06
Hydrogen	3·60
Oxygen and nitrogen	1·89
Sulphur	1·02
Ash	1·36

Analyst—Jas. S. Merry and Co.

Date of Analysis—November 22, 1904.

CARMARTHEN. *Notes*

CARWAY LIMITED,

Pontyates.

Colliery—CARWAY, Big Vein Seam, Carway Slant Pit.
Shipping Ports—Swansea, Llanelly, Burry Port.
Rail—Great Western, Burry Port Station.
Canal—None.

Anthracite Coal.

Class of Coal—Anthracite.

Sample dried at 100 degs. Cent. gave :—

	Per cent.
Volatile matter	5·80
Ash	1·56
Fixed carbonaceous matter ..	92·64
	100·00

The composition of the dried coal was :—

	Per cent.
Carbon	91·42
Hydrogen ..	3·58
Oxygen and nitrogen ..	2·54
Sulphur	0·90
Ash	1·56
	100·00

Analysts—Morgan and Seyler.
Date of Analysis—April 1905.

CAWDOR AND GARNANT COLLIERIES LIMITED,

13, Exchange Buildings, Swansea.

Colliery—GARNANT, Peacock Vein Seam, One Slant.
Shipping Ports—Swansea, Llanelly.
Rail—Great Western, Garnant Station.
Canal—None.

Garnant Peacock Vein Coal.

Class of Coal—Anthracite.

The coal dried at 100 degs. Cent. gave :—

	Per cent.
Volatile matter	6·00
Ash	1·75
Fixed carbonaceous matter ..	92·25
	100·00

Notes.

CARMARTHEN.

Garnant Peacock Vein Coal—*cont.*

The composition of the dried sample was as follows :—

	Per cent
Carbon	91·50
Hydrogen	3·67
Oxygen and nitrogen	2·23
Sulphur	0·85
Ash	1·75
	100·00

The sulphur in the ash was 0·07 per cent., making total sulphur 0·92 per cent. The calorific power was 8,624 calories, equivalent to 16·06 lb. of water evaporated from and at 100 degs. Cent. per pound of coal (the water formed by the combustion of the coal, 0·333 lb., being condensed).

Analyst—Clarence A. Seyler, B.Sc., F I.C.
Date of Analysis—June 8, 1904.

Colliery—CAWDOR, Red Vein Seam, One Slant.

Red Vein Coal.

Class of Coal—Anthracite.

The sample as received contained ;—

	Per cent.
Moisture	1·29
Volatile matter	6·30
Fixed residue (including ash) ..	92·41
	100·00

The sample dried at 100 degs. Centigrade contained :—

	Per cent.
Carbon	90·14
Hydrogen	3·88
Oxygen and nitrogen	2·47
Sulphur (combustible)	0·75
Ash	2·76
	100·00

Analysts—Wm. Morgan, Son and Seyler.
Date of Analysis—March 25, 1899.

Notes.

CARMARTHEN.

EMLYN ANTHRACITE COLLIERY LIMITED,

17, York Place, Swansea.

Colliery—EMLYN, Stanllydd Vein and Pumpquart Vein Seams, Pit and Slant . . . . . .

Shipping Ports—All South Wales Ports.

Rail—Great Western, Cross Hands Station.

Canal—None.

Emlyn Anthracite.

Class of Coal—Anthracite.

	Per cent.
Carbon	91·20
Hydrogen	2·95
Oxygen	2·46
Nitrogen	1·13
Sulphur	0·80
Ash	1·46
	100·00

Analyst—Bernard Dyer, D.Sc., F.I.C., F.C.S., etc.

Date of Analysis—May 31, 1905.

GELLYCEIDRIM COLLIERIES COMPANY LIMITED,

14, Cambrian Place, Swansea.

Colliery—GELLYCEIDRIM, "Big" Seam, Gellyceidrim Pit.

Shipping Ports—Swansea, Llanelly.

Rail—Great Western, L. and N. W., Garnant Station.

Canal—None.

Gellyceidrim Big Vein Malting Coal.

Class of Coal—Anthracite.

Chemical analysis—	Per cent.
Moisture	0·106
Carbon	93·578
Hydrogen	1·623
Nitrogen and oxygen	4·159
Sulphur	0·118
Ash	0·416
	100·000

Analyst—John Percy, M.D., F.R.S.

Date of Analysis—August, 1888.

Notes.

CARMARTHEN.

GREAT MOUNTAIN COLLIERIES COMPANY LIMITED,

Victoria Road, Llanelly.

Colliery—GREAT MOUNTAIN, Tumble, Llanelly and Mynydd Mawr Railway Seam, Great Mountain Pit.

Shipping Ports—Llanelly, Burry Port, Swansea.

Rail—Llanelly and Mynydd Mawr, Tumble Station.

Canal— . . . . . .

Great Mountain Anthracite Coal.

Class of Coal—Anthracite.

	Per cent.
Carbon	92·19
Hydrogen	3·76
Oxygen	1·81
Nitrogen	0·70
Sulphur	0·83
Ash	0·71
	100·00

The most careful tests prove the sample to be free from all traces of arsenic.

Analyst—W. Lincolne Sutton, F.I.C.

Date of Analysis—March 22, 1901.

LLANDEBIE COLLIERY COMPANY LIMITED,

2, Gloucester Place, Swansea.

Colliery—LLANDEBIE, Lower Pumpquart Seam, ... Pit.

Shipping Ports—Swansea, Llanelly.

Rail—Great Western, Tirydail Station.

Canal—None.

Llandebie Coal (Lower Pumpquart)

Class of Coal—Anthracite.

The composition of the dry coal was as follows:—

Carbon	92·70
Hydrogen	3·31
Oxygen and Nitrogen	2·29
Sulphur	0·70
Ash	1·00
	100·00

Notes.

CARMARTHEN.

The sulphur in the ash was 0·05 per cent., making total sulphur 0·75 per cent. The calorific power was 8,592 calories, equivalent to 16 lb. of water evaporated from and at 100 degs. Cent. per pound of coal (the water formed by the combustion of the coal, 0·30 lb., being condensed).

Analysts—Wm. Morgan and Seyler.

Date of Analysis—March 29, 1905.

I have made a most careful examination of the sample of coal marked "coal from Llandebie Colliery," and I find that it is free from arsenic. This quality should render it an extremely desirable coal for malting purposes, and ought to command a ready sale amongst maltsters who make malt of a high class.

Analyst—John Heron, F.I.C., F.C.S.

Date of Analysis—March 13, 1905.

NEW CROSS HANDS COLLIERIES LIMITED,

Stafford Chambers, Llanelly.

Colliery— . . . . . Seam, ... Pit.

Shipping Port— . . . . . .

Rail— . . . . . Station.

Canal— . . . . . .

New Cross Hands Coal.

Class of Coal— . . . . . .

The sample dried at 100 degs. Cent. gave the following results :—

	Per cent.
Volatile matter	3·80
Fixed carbonaceous residue ..	95·44
Ash	0·76
	100·00

The composition of the dried coal was as follows :—

	Per cent.
Carbon	92·73
Hydrogen	3·37
Oxygen and nitrogen	2·69
Sulphur	0·45
Ash	0·76
	100·00

The above coal was free from arsenic.

Analysts—Wm. Morgan and Seyler.

Dates of Analysis—January 25, 1901, January 14, 1903.

Notes.

CARMARTHEN.

PONTYBEREM COLLIERIES COMPANY LIMITED,

1 and 2, Great Winchester Street, London, E.C.

Colliery—PONTYBEREM, Big Vein Seam, ... Pit.
Shipping Port—Burry Port.
Rail— . . . . . Station.
Canal— . . .

Pontyberem "Big Vein" Anthracite Cobbles.

Class of Coal—Anthracite.

Sample dried at 212 degs. Fahr. :—

	Per cent.
Fixed carbon	94·28
Volatile matter	4·06
Ash	0·84
Sulphur	0·82
	100·00

Moisture lost at 212 degs. Fahr. .. .. 1·83 per cent.

I also carefully examined the coal for the presence of arsenic, and found the fuel to be quite free from this element.

Analyst—Harry Silvester, B.Sc., F.I.C., F.C.S., etc.
Date of Analysis— . . . . . , 1901.

Sample dried at 212 degs. Fahr. :—

	Per cent.
Fixed carbon	92·59
Volatile matter	4·72
Ash	1·84
Sulphur	0·85
	100·00

Moisture lost at 212 degs. Fahr. .. .. 2·28 per cent
Arsenic.. .. .. *Nil.*

Analyst—Harry Silvester, B.Sc., F.I.C., etc.
Date of Analysis—June 11, 1906.

CARMARTHEN.

Notes.

Pontyberem Clynhebog Anthracite Coal.

Class of Coal—Anthracite.

	Per cent.
Fixed carbon	93·90
Volatile matter	4·23
Ash	1·22
Sulphur	0·65
Moisture	*Nil.*
	100·00

Moisture lost at 212 degs. Fahr. .. .. 2·74 per cent.

The coal was carefully examined for arsenic, and was found to be entirely free from this element.

Analyst—Harry Silvester, F.I.C., F.C.S., etc.

Date of Analysis—March 11, 1901.

Pontyberem "Clynhebog No. 1 Coal."

Class of Coal—Anthracite.

	Per cent.
Sample dried at 212 degs. Fahr. :—	
Fixed carbon	94·58
Volatile matter	3·74
Ash	1·12
Sulphur	0·56
	100·00

Moisture lost at 212 degs. Fahr. .. .. 2·24 per cent.

Arsenic.. .. .. *Nil.*

Analyst—Harry Silvester, B.Sc., F.I.C., etc.

Date of Analysis—June 11, 1906.

Notes.

CARMARTHEN.

WESTERN VALLEYS ANTHRACITE COMPANY,

Gloster Chambers, Swansea.

Colliery—TIRYDAIL, ... Seam, ... Pit.
Shipping Ports—Swansea, Llanelly, Burry Port.
Rail— . . . . . Station.
Canal— . . . . . .

Tirydail Coal.

Class of Coal—Anthracite.

The sample dried at 100 degs. Cent. gave the following results:

	Per cent.
Volatile matter	5·30
Fixed carbonaceous residue .	93·60
Ash	1·10
	100·00

The composition of the dried coal was as follows:—

	Per cent.
Carbon	91·60
Hydrogen	3·61
Oxygen and nitrogen	3·25
Sulphur (combustible)	0·44
Ash	1·10
	100·00

The slight trace of arsenic is so infinitesimal that the coal can be declared as free.

Analysts—Wm. Morgan and Seyler.

Date of Analysis—January 23, 1901; May 30, 1905.

Notes.

DENBIGH.

BROUGHTON AND PLAS POWER COAL COMPANY LIMITED,

Wrexham.

Colliery—PLAS POWER AND GATEWEN, Main and Four-foot Seams, Plas Power and Gatewen Pits.

Shipping Ports—Birkenhead, Ellesmere Port, Connah's Quay.

Rail—Great Central, Great Western, Plas Power, and Moss and Pentre Stations.

Canal—None.

Main and Four-foot Seams Coals.

Class of Coal—Gas, Steam, Manufacturing, House.

	Main. Per cent.	Four-feet Seam. Per cent.
Ash	2·45	3·20
Moisture	3·10	4·00
Carbon	77·77	78·18
Hydrogen	5·15	4·85
Oxygen (by difference)	8·65	7·53
Nitrogen	1·54	1·40
Sulphur	1·34	0·84
	100·00	100·00
	Per cent.	Per cent.
Fixed carbon (coke-ash)	57·25	57·10
Volatile matter	40·30	39·70
Coke	59·70	60·30

Analyst—A. N. Palmer, F.C.S.

Date of Analysis—April 6, 1905.

VAUXHALL COLLIERY COMPANY LIMITED,

Ruabon.

Colliery—VAUXHALL, Quaker Seam, ... Pit.

Shipping Ports—Birkenhead, Ellesmere Port.

Rail—Great Westeru, Ruabon Station.

Canal—None.

Quaker Coal.

Class of Coal—Gas, House.

A sample of this coal, representing the entire product of the seam, gave on examination the following results:—

Notes.

DENBIGH.

Quaker Coal—*cont.*

The coal is black, possesses considerable lustre and brown streak; fracture irregular, partly defined by laminæ of vegetable charcoal, while cross-fracture is angular and highly crystalline, with deposits of calcium carbonate and traces of ferric bisulphide in the natural partings; cohesive, compact, and of very uniform composition and density; mean specific gravity 1·247 (water 1·000); weight of 1 cubic foot, 77·93 lb.

		Per cent.
Volatile matters (containing 0·32 of sulphur)		33·89
Coke, consisting of—		
Carbon	60·17	
Sulphur	0·18	
Ash	2·26	
		62·61
Water expelled at 212 degs. Fahr. ..		3·50
		100·00

Gaseous products—	
Gas per ton of coal at 60 degs. Fahr., and 30 in. bar.	12,125 cubic feet
Gas from 1 cubic foot of the coal	421·83 cubic feet
Specific gravity of the gas	·498 (air 1·000)
Hydrocarbons absorbed by bromine ..	5·80 per cent.
Durability of 1 cubic foot by 5 in. jet flame	41 min. 9 sec.
Value of 1 cubic foot of gas in sperm ..	474·24 grains
Value of gas from 1 ton of coal in sperm	821·45 lb.
Illuminating power of gas in standard candles (per London Argand)	19·76 candles
Sulphuretted hydrogen (H_2S) in foul gas	0·75 per cent.
Carbonic acid (CO_2) in foul gas	2·50 per cent.
Carbonic oxide (CO) in foul gas	8·00 per cent.
Sulphur eliminated with volatile products	7·17 lb.
Liquid products—	
Tar per ton of coal	14·50 gallons
Ammoniacal liquor per ton of coal ..	14·12 gallons
Strength of ammoniacal liquor	2·75 degs. Twadd.
Hygrometric water per ton of coal ..	7·84 gallons
Aqueous absorbent capacity of coal (determined by complete saturation)	5·10 per cent.
Solid products—	
Coke per ton of coal	1,402·46 lb.
Carbon in the coke	96·40 per cent.
Ash in the coke	3·60 per cent.
Sulphur in coke per ton of coal	4·03 lb.
Heating power of 1 lb. of coke (water from boiling point into steam)..	13·24 lb.

Notes.

DENBIGH.

This coal yields a large volume of comparatively rich gas, affords 12·52 cwt. of first-class coke, and is in every other respect a first-class gas and coking coal. In distillation it parts with its volatile constituents speedily, and the foul gas contains an unusually small percentage of impurities. Compared with Main Lesmahagow cannel coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1,535·5 lb. of sperm per ton, and having regard also to the value of the secondary products, and the cost of the purification of the gas), this coal is equal to 63·18.

Analyst—Geo. R. Hislop, F.C.S., F.I.Inst., F.R.S.S.A.

Date of Analysis—April 7, 1894.

Notes.

FLINTSHIRE.

HEATHS DEE COLLIERIES LIMITED,

Llanerch-y-mor, Holywell.

Colliery—LLANERCHYMOR, ... Seam, Llanerchymor Pit.
Shipping Ports—Llanerchymor Wharf, on the Dee.
Rail—Great Western, Llanerchymor Siding, Holywell Station.
Canal—None.

Heaths Dee Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

	Per cent.
Coke—	
Ash	3·920
Fixed carbon	60·705
Volatile matter—	
Moisture	5·615
Volatile combustible matter	29·760
	100·000
Sulphur	0·623

Calorific power determined by oxgen calorimeter, 8,952.
Analysts—Thompson and Middleton.
Date of Analysis— . . . . . .

G. WATKINSON AND SONS LIMITED,

Buckley, Chester.

Colliery—BUCKLEY, ... Seam, ... Pit.
Shipping Ports—Connah's Quay, Birkenhead, Ellesmere Port.
Rail—Great Central, Buckley Station.
Canal— . . . . . .

Buckley Steam Coal.

Class of Coal—Steam.

	Per cent.
Volatile matters other than sulphur and water	35·70
Fixed carbon	53·25
Sulphur	1·37
Ash	3·62
Water	6·06
	100·00
Composition of ash—	Per cent.
Silica	1·12
Lime	0·40
Phosphorus	0·012

Analyst—A. Norman Tait and Co.
Date of Analysis—February 1, 1905.

GLAMORGAN.

Notes.

BLAENCLYDACH COLLIERY COMPANY LIMITED,

9, Mount Stuart Square, Cardiff.

Colliery—BLAENCLYDACH, Abergorky Seam, Abergorky Pit.
Shipping Ports—Cardiff, Barry, Newport, Port Talbot, Swansea.
Rail—Taff Vale, Blaenclydach (Trealaw) Station.
Canal— . . . . . .

Blaenclydach Coal.

Class of Coal—Steam, Manufacturing.

	Per cent.
Volatile matter	19·37
Carbon	75·73
Moisture	1·20
Ash	3·01
Sulphur	0·69
	100·00

Analyst—F. G. Treharne.
Date of Analysis—May, 1905.

CAMBRIAN COLLIERIES LIMITED,

Bute Docks, Cardiff.

Colliery— . . . . . Seam, ... Pit.
Shipping Ports—Cardiff, Penarth, Barry, Port Talbot.
Rail—Great Western, Barry, Taff Vale, ... Station.
Canal—None.

Cambrian Navigation Steam Coal.

Class of Coal—Steam.

	Per cent.
Carbon	90·06
Hydrogen	5·16
Oxygen	2·79
Nitrogen	0·79
Sulphur	0·58
Ash	0·62
	100·00

The analysis was made on the coal dried at 212 degs. Fahr. The coal contained, as received, moisture, at 212 degs. Fahr., 0·76 per cent. The chemical composition of the above coal is very good; it contains a high percentage of carbon, with a very small quantity of sulphur and ash.

Analyst—Edward Riley, F.C.S.
Date of Analysis— . . . . . .

Notes.

GLAMORGAN.

CARDIFF HOUSE AND STEAM COAL COMPANY LIMITED,

24, Duke Street, Cardiff.

Colliery—TY-GWYN-BACH, Two and a-half Feet Seam, Level Pit.
Shipping Port—None.
Rail—Great Western and Port Talbot, Nantyffyllon Station.
Canal—None.

Ty-Gwyn-Bach Small Coal.

Class of Coal—House and Steam (?).

	Per cent.
Volatile matter	17·250
Fixed carbon	79·550
Ash	3·200

This is an excellent coal for coking, very clean, and of strong structure.

Analyst—Arthur R. Roberts.
Date of Analysis—April 15, 1902.

CLYNE VALLEY COLLIERY COMPANY,

58, Wind Street, Swansea.

Colliery—CLYNE VALLEY, Yankee Seam, ... Pit.
Shipping Ports—Swansea, Port Talbot, etc.
Rail—L. and N. W., Mumbles Road Station.
Canal—None.

Yankee Seam Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

The coal dried at 100 degs. Cent. gave the following results:—

	Per cent.
Volatile matter	30·10
Ash	2·30
Fixed carbonaceous matter ..	67·60
	100·00

	Per cent.
Carbon	85·10
Hydrogen	5·38
Oxygen and nitrogen	6·09
Sulphur	1·13
Ash	2·30
	100·00

GLAMORGAN.

Notes.

The calorific power was 8,520 calories, equivalent to 15·86 lb. of water evaporated from and at 100 degs. Cent. per pound of coal, or deducting the water formed by combustion (0·48 lb.) 15·38 lb. net. The coal caked well and yielded a metallic coke considerably swollen, and would be an excellent smith's or gas coal. It is an "ortho-bituminous," or true bituminous coal, having a high yield of coke and good caking power.

Analysts—Wm. Morgan and Seyler.

Date of Analysis—December 11, 1903.

Colliery—CLYNE VALLEY, Four-foot Seam, ... Pit.

Four-foot Seam Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

The coal dried at 100 degs. Cent. gave the following results:—

	Per cent.
Volatile matter	29·50
Ash	2·64
Fixed carbonaceous matter ..	67·86
	100·00

	Per cent.
Carbon	85·40
Hydrogen	5·16
Oxygen and nitrogen ..	5·62
Sulphur	1·18
Ash	2·64
	100·00

The calorific power was 8,504 calories, equivalent to 15·83 pounds of water evaporated from and at 100 deg. Cent. per pound of coal, or deducting the water formed by combustion (0·46 lb.) 15·37 lb. net. The caking power was considerable and the coke metallic but not very swollen. It is an "ortho-bituminous," or true bituminous coal, having a high yield of coke and good caking power, and would form an excellent coal for coke or gasmaking, or for smith's work.

Analysts—Wm. Morgan and Seyler.

Date of Analysis—December 11, 1903.

Notes.

GLAMORGAN.

Colliery—CLYNE VALLEY, Three-foot Seam, ... Pit.

Three-foot Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

The coal dried at 100 degs. Cent. gave the following results :—

	Per cent.
Volatile matter	29·90
Ash	4·34
Fixed carbonaceous matter ..	65·76
	100·00

	Per cent.
Carbon	82·70
Hydrogen	5·21
Oxygen and nitrogen ..	6·91
Sulphur	0·84
Ash	4·34
	100·00

The calorific power was 8,240 calories, equivalent to 15·34 lb. of water evaporated from and at 100 degs. Cent. per pound of coal, or deducting the water formed by combustion (0·47 lb.) 14·87 lb. net. The coal caked well and yielded a metallic compact coke. It is of the "ortho-bituminous," or true bituminous class, having a high yield of coke and good caking power, and would form an excellent coal for coke or gasmaking, or smith's work.

Analysts—Wm. Morgan and Seyler.
Date of Analysis—December 11, 1903.

Colliery—CLYNE VALLEY, Six-foot Seam, ... Pit.

Six-foot Seam Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

The coal dried at 100 degs. Cent. gave the following results :—

	Per cent.
Volatile matter	30·22
Ash	1·85

Analysts—Wm. Morgan and Seyler.
Date of Analysis—February 13, 1906.

GLAMORGAN.

Notes.

Colliery—CLYNE VALLEY, Five-foot Seam, ... Pit.

Five-foot Seam Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

The coal dried at 100 degs. Cent. gave the following results :—

	Per cent.
Volatile matter	30·37
Ash	1·75

Analysts—Wm. Morgan and Seyler.

Date of Analysis—February 13, 1906.

CORY BROTHERS AND CO. LIMITED,

Bute Docks, Cardiff.

Colliery— . . . . . Seam, ... Pit.

Shipping Ports—Cardiff, Penarth, Barry, Newport, Swansea, and Port Talbot.

Rail— . . . . . Station.

Canal— . . . . . .

Navigation Steam Coal.

Class of Coal—Steam.

	Composition per cent.	Composition per cent. dried at 212 degs. F.	Composition per cent. exclusive of Sulphur, Ash and Water.
Carbon	88·35	89·09	91·68
Hydrogen	4·71	4·75	4·89
Oxygen	2·12	2·14	2·20
Nitrogen	1·19	1·20	1·23
Sulphur	1·07	1·08	—
Ash	1·73	1·74	—
Water	0·83	—	—
	100·00	100·00	100·00

	Per cent.
Fixed carbon	86·52
Volatile matter, other than sulphur and water	9·85
Ash, sulphur, and water	3·63
	100·00

Specific gravity, 1·286, water at 60 degs. Fahr. being 1·000; colour of ash, greyish red; coke, 88·25 per cent., fairly hard and compact, but

Notes.

GLAMORGAN.

Navigation Steam Coal—*cont.*

dull in appearance; total heat units (Favre and Silbermann), 8,667; calorific power (Thompson), 7,738 calories; evaporative power (weight of water evaporated per pound of coal), as determined by Thompson's calorimeter, 14·41 lb. of water.

Analyst—Thomas Hughes, F.I.C., F.C.S.
Date of Analysis—April 18, 1903.

Glyn Castle Anthracite Coal.

Class of Coal—Anthracite.

	Per cent.
Carbon	91·67
Hydrogen	3·93
Oxygen	1·87
Nitrogen	0·44
Sulphur	0·77
Ash	1·32
	100·00

Analyst—Thomas Hughes.
Date of Analysis—April 29, 1892.

"Cory's Merthyr" Large Steam Coal.

Class of Coal—Steam.

	Composition. Per cent.	Composition per cent, exclusive of Sulphur, Ash, and Water.
Carbon	89·07	91·83
Hydrogen	4·42	4·55
Oxygen	2·40	2·47
Nitrogen	1·11	1·15
Sulphur	0·71	—
Ash	1·86	—
Water	0·43	—
	100·00	100·00

	Per cent.
Fixed carbon	84·64
Volatile matter other than sulphur and water	12·36
Sulphur, ash and water	3·00
	100·00

GLAMORGAN.

Notes.

Nature of coal, semi-bituminous. Coke 86·5 per cent., very firm and compact, and of a dark steel grey lustre. Specific gravity 1·313, water at 60 degs. Fahr. being 1·000; colour of ash, pinkish. Calorific power or total heat units (Favre and Silbermann) to which the coal is equivalent, 8·616; evaporative power by Thompson's calorimeter 14·02 lb. of water per pound of coal, or 7·529 calories.

Analyst—Thomas Hughes, F.I.C., F.C.S.

Date of Analysis—September 11, 1891.

"Cory's Aberdare Merthyr" Large Steam Coal.

Class of Coal—Steam.

	Composition per cent.	Composition per cent. exclusive of Sulphur, Ash and Water.
Carbon	86·01	91·25
Hydrogen	4·65	4·93
Oxygen	2·61	2·77
Nitrogen	0·99	1·05
Sulphur	1·56	—
Ash	2·93	—
Water	1·25	—
	100·00	100·00

	Per cent.
Fixed carbon	76·07
Volatile matter (other than sulphur and water)	18·19
Ash, sulphur and water	5·74
	100·00

Specific gravity 1·292, water at 60 degs. Fahr. being 1·000; colour of ash, brownish; coke, 79 per cent., hard and compact, and of a steel grey lustre; total heat units (Favre and Silbermann), 8,441; calorific power (Thompson), 7,856; evaporative power (Thompson), 14·63 lb. of water per pound of coal.

Analyst—Thomas Hughes, F.I.C., F.C.S.

Date of Analysis—December 21, 1892.

Notes.

GLAMORGAN.

Rheola Merthyr Steam Coal.

Class of Coal—Steam.

	Composition per cent.	Composition per cent. exclusive of Sulphur, Ash and Water.
Carbon	87·65	92·36
Hydrogen	4·05	4·27
Oxygen	2·21	2·33
Nitrogen	0·99	1·04
Sulphur	1·01	—
Ash	2·78	—
Water	1·31	—
	100·00	100·00

	Per cent.
Fixed carbon	86·92
Volatile matter other than sulphur and water	7·98
Sulphur, ash and water	5·10
	100·00

Nature of coal, semi-bituminous; colour of ash, greyish; specific gravity of coal 1·341, water at 60 degs. Fahr. being 1·000; total heat units (Favre and Silbermann) to which the coal is equivalent, 8,381; calorific power, determined by Berthier's method, 7,960 calories.

Analyst—Thomas Hughes, F.I.C., F.C.S.

Date of Analysis—September 12, 1895.

GLAMORGAN.

Notes.

CWMAMMAN COAL COMPANY LIMITED,

Aberdare.

Colliery—CWMAMMAN, ... Seam, Cwmamman Pit.
Shipping Ports—Cardiff, Barry, Newport, Swansea, and Port Talbot.
Rail—Great Western, Taff Vale, Rhymney, Dare Junction (G.W.), Middle Duffryn (T.V. and R.) Stations.
Canal— . . . . .

Cwmamman Steam Coal

Class of Coal—Smokeless Steam.

	Per cent.
Carbon	91·11
Hydrogen	3·95
Oxygen	1·55
Nitrogen	·90
Sulphur	·52
Ash	1·97
	100·00

Analyst—I. W. Thomas.
Date of Analysis— . . . . . .

Cwmamman Smokeless Steam Coal.

Class of Coal—Smokeless Steam.

	Per cent.
Moisture	0·70
Volatile hydrocarbon, &c.	11·76
Fixed carbon	85·57
Ash	1·97
	100·00
Yield of coke	87·54

Calculated from Berthier's test, 1 lb. of this coal possesses calorific power to convert into steam 13·93 lb. of water at 100 degs. Cent., or within 0·78 lb. as much as 1 lb. of pure carbon does.

Analyst—E. W. T. Jones.
Date of Analysis— . . . . . .

Notes.

GLAMORGAN.

Colliery—FFORCHWEN, ... Seam, Fforchwen Pit.

Fforchwen Smokeless Steam Coal.

Class of Coal—Smokeless Steam.

	Per cent.
Fixed carbon	85·74
Volatile and combustible matter	10·34
Sulphur	0·92
Ash	2·30
Moisture	0·70
	100·00

Calorific power:—1 lb. of coal converts 12·47 lb. water into steam at a temperature of 212 degs. Fahr.

Analyst—J. Stewart Remington.

Date of Analysis—May 1905.

DILLWYN COLLIERY COMPANY LIMITED,

Exchange, Cardiff.

Colliery—DILLWYN, Red Vein Seam, ... Pit.

Shipping Ports—Swansea, Port Talbot, Briton Ferry.

Rail—Neath and Brecon, Seven Sisters Station.

Canal—None.

Dillwyn Coal,

Class of Coal—Anthracite.

	Sample after drying. Per cent.	In sample as received. Per cent.
Carbon	88·79	87·24
Hydrogen	3·30	3·25
Nitrogen	0·71	0·70
Oxygen	2·10	2·07
Sulphur	1·18	1·16
Ash	3·92	3·83
Water	—	1·75
	100·00	100·00

Calorific power: Pounds of water evaporated from 212 degs. Fahr. by the burning of 1 lb. of the coal as determined in

Lord Kelvin's apparatus	15·4 lb.
Calories (French units)	8,200 units.
Volatile matters	10·40 per cent.

Analyst—J. S. Rowlands.

Date of Analysis—May 13, 1900.

GLAMORGAN.

Notes.

GLANMWRWG COLLIERY COMPANY LIMITED,

Llangennech.

Colliery—GLANMWRWG, ... Seam, ... Pit.

Shipping Ports—Swansea, Llanelly, Port Talbot, Briton Ferry.

Rail—Great Western, Llangennech Station.

Canal—None.

Glanmwrwg Coal.

Class of Coal—Steam.

	Per cent.
Fixed carbon	79·54
Volatile matter	14·52
Moisture (water)	1·56
Ash	4·38
	100·00

Analyst—F. G. Treharne.

Date of Analysis— . . . . . , 1905.

GREAT WESTERN COLLIERY COMPANY LIMITED,

The Exchange, Bristol.

Colliery—RHONDDA VALLEY, ... Seam, Various Pits.

Shipping Ports—Cardiff, Penarth, Barry, Newport, Port Talbot, Swansea.

Rail—T.V.R., Pontypridd Station.

Canal— . . . . . .

Navigation Smokeless Steam Coal.

Class of Coal—Smokeless Steam.

Ultimate analysis—	Per cent.
Carbon	86·48
Hydrogen	4·04
Oxygen	3·62
Nitrogen	0·88
Sulphur	0·70
Ash	3·04
Moisture	1·24
	100·00

Notes.

GLAMORGAN.

Navigation Smokeless Steam Coal—*cont.*

Percentage composition—	Per cent.
Moisture	1·24
Volatile matter	18·53
Ash	3·04
Carbon	77·99
	100·00

Calories by Thomson's calorimeter, 7,755; evaporative power by Thomson's calorimeter, 14·44 lb. of water at 100 degs. Cent. per pound of coal.

Analyst—F. G. Treharne.

Date of Analysis— . . . . . .

Colliery— . . . . . Seam, Maritime Level, Penrhiw, and No. 3 Pits.

Forest Coal.

Class of Coal—Bituminous.

	Per cent.
Carbon	83·26
Hydrogen	5·18
Oxygen	6·72
Nitrogen	1·23
Sulphur	0·69
Ash	1·76
Moisture	1·16
	100·00

Analyst—F. G. Treharne.

Date of Analysis— . . . . . .

Colliery—PENRHIW, ... Seam, ... Pit.

No. 3 Rhondda Coal.

Class of Coal—Bituminous.

Ultimate analysis—	Per cent.
Carbon	84·93
Hydrogen	5·11
Oxygen	4·91
Nitrogen	1·08
Sulphur	0·74
Ash	1·64
Moisture	1·59
	100·00

GLAMORGAN.

Notes.

Percentage composition—	Per cent.
Moisture	1·59
Volatile matter	24·58
Ash	1·64
Fixed carbon	72·19
	100·00

Analyst—F. G. Treharne.

Date of Analysis— . . . . . .

HILL'S PLYMOUTH COMPANY LIMITED,

Merthyr Tydvil.

Colliery—HILL'S PLYMOUTH, Upper Four-feet and Nine-feet Seams, South Pits.

Shipping Ports—Cardiff, Penarth, Barry, Newport, Swansea, Port Talbot.

Rail—Taff Vale, Pentrebach Station.

Canal—None.

Hill's Plymouth Merthyr Smokeless Steam Coal.

Class of Coal—Smokeless Steam.

	Per cent.
Carbon	86·98
Hydrogen	4·39
Oxygen	1·72
Nitrogen	1·01
Sulphur	0·86
Ash	3·97
Moisture	1·07
	100·00

Total heat units (Favre and Silbermann), 8,439 calories.

Analyst—F. G. Treharne.

Date of Analysis—October 27, 1900.

Notes.

GLAMORGAN.

W. W. HOLMES AND CO.,

2, Gloucester Place, Swansea.

Colliery—KILLAN, Penclawdd and Penlan Seams, ... Pit
Shipping Port—Swansea.
Rail—L. and N. W., Dunvant Station.
Canal—None.

Killan Coal.

Class of Coal—Gas, Manufacturing, House.

	Per cent.
Volatile matter	33·30
Ash	3·22
Moisture	1·50

Analyst— . . . . . .
Date of Analysis—May 5, 1903.

LYNCH COLLIERY COMPANY,

Llanmorlais, Penclawdd.

Colliery—LYNCH, Lynch Seam, Drift and Slant Pit.
Shipping Port—Swansea.
Rail—L. and N. W., Llanmorlais Station.
Canal—None.

Lynch Coal.

Class of Coal—House.

	Per cent.
Volatile matter	26·30
Ash	2·35
Fixed carbonaceous matter ..	71·35
	100·00
Coke	73·70

The total sulphur in the coal was 1·58 per cent. on the dry coal. The sample as received contained 1·20 per cent. moisture. The coke was grey, metallic, and considerably swollen.

Analysts—Wm. Morgan and Seyler.
Date of Analysis— . . . . . .

GLAMORGAN.

Notes.

MERTHYR LLANTWIT COLLIERY COMPANY,

Burrows Chambers, Swansea.

Colliery—MERTHYR LLANTWIT, Wenalt Seam, ... Pit.
Shipping Ports—Swansea, Port Talbot.
Rail—Great Western, Port Talbot and Briton Ferry Stations.
Canal—None.

Merthyr Llantwit Coal.

Class of Coal—Steam, Manufacturing, House.

	Per cent.
Fixed carbon	73·72
Volatile matter	17·72
Ash	7·75
Moisture	0·81
	100·00
Sulphur	2·41

Analysts—H. A. Penrose & Co.

Date of Analysis— . . . . . .

NAVAL COLLIERY COMPANY (1897) LIMITED,

Cardiff.

Colliery— . . . . . , Naval Seam, Pandy, Ely, and Nantgwyn Pits.
Shipping Ports—Cardiff, Barry, Newport, Port Talbot.
Rail—Taff Vale and Great Western, Dinas and Penygraig Stations.
Canal—None.

	Pure coal from Naval Seam. Per cent.	Sample taken during and throughout a shipment. Per cent.
Fixed carbon	80·16	78·83
Volatile matter	16·37	16·64
Ash	2·46	3·49
Water (moisture)	1·01	1·04
	100·00	100·00
Percentage of sulphur	0·63	0·68

Notes.

GLAMORGAN.

Complete ultimate analysis:—	Per cent.	Per cent.
Carbon	88·14	87·04
Hydrogen	4·58	4·55
Oxygen	2·11	2·19
Nitrogen	1·07	1·01
Sulphur	0·63	0·68
Ash	2·46	3·49
Moisture	1 01	1·04
	100·00	100·00
Calorific value by Thompson's calorimeter	7,989 calories	7,929 calories
Evaporative power by Thompson's calorimeter (water evaporated at 212 degs. Fahr. per pound of coal)	14·87 lb.	14·74 lb.
Its total heat units (Favre and Silbermann) value is	8,607 calories	8,444 calories

Its specific gravity, water at 60 degs. Fahr. being 1·000, is 1·311; the ash was tested for fusibility and found to belong to the non-fusible type; the coal burns freely, and slightly agglomerates in the fire.

Analyst—F. Gwilym Treharne.

Dates of Analysis—January 30 and February 1, 1904.

NEW BLAENGARW COLLIERY COMPANY LIMITED,

2, Cambrian Place, Swansea.

Colliery—NEW BLAENGARW, Victoria Seam, ... Pit.
Shipping Ports—Port Talbot, Swansea, Barry, Cardiff.
Rail—Great Western, Blaengarw Station.
Canal—None.

Blaengarw Coal.

Class of Coal—Coking, Smiths' and Manufacturing.

	Per cent.
Volatile matter	23
Carbon	74
Ash	3

Analysts—H. A. Penrose and Co.

Date of Analysis— . . . . . .

GLAMORGAN. *Notes.*

Blaengarw Victoria Large Coal.

Class of Coal—Coking, Smiths' and Manufacturing.

	Per cent.
Volatile matter	23
Carbon	74
Ash	3

Analysts—J. S. Merry and Co.

Date of Analysis—July 25, 1906.

PHILLIPS AND MOGFORD,

Pontypridd.

Colliery—PWLLGWAUN, Forest-fach Seam, Pwllgwaun Pit.
Shipping Port—Cardiff.
Rail—Taff Vale, Pontypridd Station.
Canal—Glamorganshire.

Pwllgwaun Coal.

Class of Coal—House, Gas.

The sample (through coal) was examined for gas purposes, with the following results:—

	Per cent
Fixed products	71·80
Volatile products	28·20
Sulphur in coal	3·30
Ash in coal	2·02
	100·00

The quantity of purified gas per ton (2,240 lb.) at 30 in. bar. and 60 degs. Fahr. was 9,920 cubic feet. The coal is low in ash, the coke is bright and coherent, and the yield of gas is good. Coke, 71·80 per cent.

Analyst—J. S. Rowland.

Date of Analysis—June 5, 1895.

Notes.

GLAMORGAN.

PHŒNIX MERTHYR COAL COMPANY LIMITED,

50, Mount Stuart Square, Cardiff.

Colliery—PHŒNIX MERTHYR, Glyncorrwg Seam, Phœnix Glyncorrwg Pit.

Shipping Ports—Port Talbot, Cardiff, Swansea.

Rail—Rhondda and Swansea Bay, Cymmer Station.

Canal—None.

Phœnix Merthyr Coal.

Class of Coal—Smokeless Steam, Coking.

Sample of Phœnix Merthyr coal, sampled by me personally on May 16, 1905, all along the face of the seam, now working in the Left and Right Headings and Main Deep.

	Per cent.
Ultimate analysis—	
Carbon	87·640
Hydrogen	4·310
Oxygen	3·300
Nitrogen	1·450
Sulphur	·800
Ash	2·500
	100·000

	Per cent.
Complete analysis—	
Fixed carbon	79·90
Volatile matter	16·80
Ash	2·50
Sulphur	·80
	100·00

Calorific power (by Thompson's calorimeter)	8,580 calories
Calorific power, water evaporated at 212 degs. Fahr. per 1 lb. of coal	15·444 lb.
Yield of strong and dense coke	83·20 per cent.

Analyst—Arthur R. Roberts.

Date of Analysis—May 31, 1905.

GLAMORGAN. *Notes.*

PONTARDAWE COLLIERIES COMPANY LIMITED,

8, Exchange Buildings, Swansea.

Colliery—CWMNANT, Graigola Four-feet Seam, . . . Pit.
Shipping Port—Swansea.
Rail—Midland, Pontardawe Station.
Canal—G.W.R., Swansea Vale.

Cwmnant Smokeless Steam Coal.

Class of Coal—Smokeless Steam

	Per cent.
Carbon	85·44
Volatile matter	10·04
Sulphur	0·98
Ash	3·54

Analysts—Hy. A. Penrose and Co.
Date of Analysis—August 15, 1903.

Colliery—CWMDU, Pinchin, Four-feet Three-inch Seam, ... Pit.

Cwmdu Anthracite Coal.

Class of Coal—Anthracite.

	Per cent.
Carbon	91·20
Volatile matter	6·50
Sulphur	0·71
Ash	1·59

Analysts—Hy. A. Penrose and Co.
Date of Analysis—August 15, 1903.

Notes.

GLAMORGAN.

PONTARDULAIS COLLIERIES COMPANY,

46, Queen Victoria Street, London, E.C.

Colliery—PONTARDULAIS, Four-foot Seam, ... Pit.
Shipping Ports—Swansea, Llanelly.
Rail—Great Western, and L. and N. W., Pontardulais Station.
Canal— . . . . . .

Pontardulais Smokeless Steam Coal.

Class of Coal—Smokeless Steam.

	Per cent.
Moisture	0·68
Volatile matter (including sulphur 0·98)	12·32
Fixed carbon	82·48
Ash	4·52
	100·00
Specific gravity	1·350
Calories (per Thompson's calorimeter test)	1,403

Analyst—B. Kitto.
Date of Analysis—October 1903.

PYMAN, WATSON AND CO. LIMITED,

Cardiff.

Colliery—FFALDAU, ... Seam, ... Pit.
Shipping Ports—Cardiff, Port Talbot, Swansea.
Rail—Great Western, Pontycymmer Station.
Canal— . . . . . .

Oriental Merthyr Steam Coal.

Class of Coal—Smokeless Steam.

Sample taken throughout the shipment of a cargo :—

	Per cent.
Carbon	86·76
Hydrogen	4·76
Oxygen	2·24
Nitrogen	1·29
Sulphur	0·67
Ash	3·37
Moisture	0·91
	100·00

GLAMORGAN.

Notes.

Calorific value (determined by Thomson's calorimeter)	7,991 calories
Its evaporative value, by Thomson's calorimeter (water evaporated at 212 degs. Fahr. per pound of coal)	14·9 lb.
Specific gravity (water at 60 degs. Fahr. being 1·000)	1·299

The coals burns freely, is of good evaporative value, and it is noted also that very little waste is made owing to small passing through the bars. The small coal caking slightly prevents this loss to a very large extent.

Analyst—F. G. Treharne, F.C.S.

Date of Analysis—January 21, 1904.

TALBOT MERTHYR COLLIERY LIMITED,

83, Exchange, Cardiff.

Colliery—TALBOT MERTHYR, Mountain Seam, Level.

Shipping Ports—Port Talbot, Cardiff, Swansea.

Rail—Port Talbot, Port Talbot Station, or South Wales Mineral Railway.

Canal—None.

Talbot Merthyr Coal.

Class of Coal—Steam (Semi-bituminous).

Sample dried at 212 degs. Fahr. :—

	Per cent.
Fixed carbon	78·02
Volatile matter	18·83
Ash	3·15
	100·00
Sulphur	1·28
Moisture	0·83

Analyst—J. S. Rowland.

Date of Analysis—March 5, 1900.

Notes.

GLAMORGAN.

TON PHILLIP RHONDDA COLLIERY COMPANY LIMITED,

8, Cambrian Place, Swansea.

Colliery—TON PHILLIP, Rock Vawr Seam, Ton Phillip Slants Pit.
Shipping Ports—Port Talbot, Swansea.
Rail—Port Talbot, Bryndu Station.
Canal—None.

Top Coal, Bottom Coal.

Class of Coal—Gas, Steam, Manufacturing, House.

	Top coal. Per cent.	Bottom coal. Per cent.
Fixed carbon	63·45	61·15
Volatile matter..	34·10	36·50
Ash	2·45	2·35

Analysts—J. S. Merry and Co.
Date of Analysis—October 8, 1901.

TROEDYRHIW COAL COMPANY,

12, Bute Crescent, Cardiff.

Colliery—YNYSFAIO, Upper Four-feet Seam, Ynysfaio Pit.
Shipping Ports—Cardiff, Penarth, Barry, Newport, Port Talbot
Rail—Taff Vale, Treherbert Station.
Canal—None.

Ynysfaio Upper Four-feet Steam Coal.

Class of Coal—Steam.

	Per cent.
Fixed carbon	85·57
Volatile hydrocarbons	11·69
Sulphur	0·53
Ash	0·99
Moisture	1·22
	100·00

This is a remarkably pure coal.

Analysts—R. W. and A. J. Atkinson.
Date of Analysis—March 25, 1893.

GLAMORGAN.

Notes.

WESTERN VALLEYS ANTHRACITE COMPANY,

Gloster Chambers, Swansea.

Colliery—CWMGORSE, Red Vein Seam, ... Pit.
Shipping Ports—Swansea, Llanelly, Burry Port.
Rail—Great Western, Gwaun Cae-Gurwen Station.
Canal—None.

Cwmgorse Anthracite.

Class of Coal—Anthracite.

The coal, dried at 100 degs. Cent., gave the following results :—

	Per cent.
Volatile matter	6·30
Ash	2·80
Fixed carbonaceous matter ..	90·90
	100·00

The composition of the dried coal was as follows :—

	Per cent.
Carbon	90·45
Hydrogen	3·64
Oxygen and nitrogen	2·05
Sulphur	1·06
Ash	2·80
	100·00

The sulphur in the ash was 0·15 per cent., making total sulphur 1·21 per cent. The calorific power was 8,540 calories, equivalent to 15·90 lb. of water evaporated from and at 100 degs. Cent. per pound of coal (the water formed by the combustion of the coal, 0·33 lb.) being condensed.

The coal contained 0·017 per cent. of phosphorus, and $\frac{1}{80}$th of a grain of arsenic per pound of coal.

Specially prepared coals for suction and pressure gas producing plants, the analysis of the actual coal taken from bulk being as follows :—

	Nuts.	Pea-nuts.	Peas.
Volatile	6·70 ..	6·40 ..	5·95 per cent.
Ash	4·75 ..	4·50 ..	4·50 per cent.
Fixed carbon ..	88·55 ..	89·10 ..	89·55 per cent
Calories	8,154 ..	8,157 ..	8,130
B.T.U.	14,677 ..	14,682 ..	14,634

Analysts—Wm. Morgan and Seyler.
Date of Analysis—March 22, 1906.

(*See also New Cross Hands Collieries Ltd.*)

Notes.

PEMBROKESHIRE.

BONVILLES COURT COAL COMPANY,

Saundersfoot, R.S.O.

Collieries—BONVILLES COURT and KILGETTY, Lower Level and Kilgetty Seams, Bonvilles Court and Kilgetty Pits.

Shipping Port—Saundersfoot.

Rail—Great Western, Saundersfoot Station.

Canal—None.

Bonvilles Court and Kilgetty Anthracite.

Class of Coal—Anthracite.

	Per cent.
Carbon	94·18
Hydrogen	2·99
Oxygen	0·50
Nitrogen	0·76
Sulphur	0·59
Ash	0·98
	100·00

Analyst—Professor Frankland.

Date of Analysis— . . . . . .

REYNOLTON COLLIERY COMPANY,

83, Exchange, Cardiff.

Colliery—REYNOLTON, Bonvilles Court Seam, Reynolton Pit.

Shipping Port—Milford Haven.

Rail—Great Western, Kilgetty and Templeton Stations.

Canal—None.

Reynolton Anthracite Coal.

Class of Coal—Anthracite.

Sample dried at 212 degs. Fahr.	Per cent.
Fixed carbon	93·08
Volatile matter	5·82
Ash	1·10
	100·00
Sulphur	0·57

This sample was carefully examined for arsenic, and only mere traces were found to be present.

Analyst—J. S. Rowland.

Date of Analysis—August 1, 1902.

PEMBROKESHIRE. *Notes.*

HOOK COLLIERY COMPANY,

Haverfordwest.

Colliery—HOOK, Timber Vein Seam, Pill Pit.
Shipping Port—(River Wharf), Milford.
Rail—None.
Canal—None.

Anthracite.

Class of Coal—Anthracite.

The sample dried at 100 degs. Cent. gave :—

	Per cent.
Volatile matter	4·70
Ash	0·84
Fixed carbonaceous residue	94·46
	100·00

The composition of the dried coal was as follows :—

	Per cent.
Carbon	93·20
Hydrogen	3·20
Oxygen and nitrogen	2·00
Sulphur	0·76
Ash	0·84
	100·00

The coal as received contained 2·1 per cent. moisture. The sulphur in the ash was 0·05 per cent., making total sulphur 0·81 per cent. The calorific power was 8,608 calories, equivalent to 16·03 lb. of water evaporated from and at 100 degs. Cent. per pound of coal (the water formed by the combustion of the coal (0·29 lb.) being condensed. The sample contained a trace of arsenic, which we estimate at 1/100 of a grain per pound of coal.

Analysts—Wm. Morgan and Seyler.

Date of Analysis—September 29, 1904.

IRELAND.

Notes.

ROSCOMMON.

ARIGNA MINING COMPANY LIMITED,

Ballinamore, Carrick-on-Shannon.

Colliery— . . . . . Seam, Aughabehy Pit.
Shipping Ports—Dundalk, Sligo.
Rail—Cavan and Leitrim, Arigna Station.
Canal—River Shannon.

Arigna Coal.

Class of Coal—Steam, Manufacturing, House.

	Per cent.
Moisture and loss on heating to 212 degs. Fahr.	1·25
Ash	6·40
Nitrogen	1·55
Sulphur	1·20
Carbon, with hydrogen and oxygen	89·60

This coal is a friable coal of a bituminous character, giving a flaming combustion. The heating power of this coal is high, and is not much under fine Irish anthracite. One gramme of this coal burnt in a Thompson's calorimeter gave a rise of temperature equal to 6·8 degs. Fahr., or 14,205·2 heat units. The heating power, therefore, is very high, whilst the sulphur and nitrogen being low makes this a valuable coal. I should think the slack of this coal would be specially valuable for making compressed fuel.

Analyst—C. R. C. Tichborne, LL.D., F.C.S., M.R.I.A., L.A.H.I.
Date of Analysis—February 4, 1889.

PART II.—COKE.

PART II.—COKE.

CUMBERLAND.

Notes.

ALLERDALE COAL COMPANY LIMITED,

Workington.

Manufactured at— . . . . .
Coal Employed— . . . .
Shipping Port—Workington.
Rail—Cleator and Workington Junction, Great Broughton Station.
Canal— . . . . . .

Buckhill Coke.

	Per cent.
Volatile matter	0·91
Carbon	87·97
Ash	9·40
Sulphur	0·79
Moisture	0·93
	100·00

Analyst—P. B. Melmore, Maryport.
Date of Analysis— . . . . .

Mr. JOSEPH HARRIS,

Brayton Domain Collieries, Brayton.

Manufactured at—Brayton.
Coal Employed—Yard Band.
Shipping Ports—Maryport and Silloth.
Rail— . . . . . Brayton Station.
Canal— . . . . . .

Brayton Domain Coke.

	Per cent.
Volatile matter	0·90
Carbon	89·08
Ash	7·84
Sulphur	1·53
Moisture	0·65
	100·00

Analyst—P. B. Melmore.
Date of Analysis—June, 1905.

Notes.

CUMBERLAND.

Messrs. THOMPSON & SONS,

Kirkhouse, Brampton Junction.

Manufactured at—Blenkinsop Colliery.

Coal Employed—Dust coal.

Shipping Port—Silloth.

Rail—North Eastern, Greenhead Station.

Canal— . . . . . .

Thompson's English Coke.

	Per cent.
Volatile matter	0·98
Fixed carbon	90·40
Sulphur	1·23
Ash	7·12
Water	0·27
	100·00
Phosphorus	0·012

This is a coke of first-class quality. It is very free from ash and contains only a moderate amount of sulphur. It is hard and durable and is altogether a coke of excellent quality.

Analysts—R. R. Tatlock and Thomson.

Date of Analysis—October 16, 1903.

WHITEHAVEN COLLIERY COMPANY,

Whitehaven.

Manufactured at—Whitehaven Collieries.

Coal Employed— . . . . . .

Shipping Port—Whitehaven.

Rail—Furness, and L. and N. W., Whitehaven Station.

Canal— . . . . . .

Whitehaven Coke.

	Sample as received. Per cent.
Fixed carbon	81·60
Volatile matter	7·12
Sulphur	1·75
Ash	9·30
Moisture	0·23
	100·00

Analyst—Robert Hellon.

Date of Analysis—November 30, 1903.

DERBY.

Notes.

MICKLEY COAL CO. (DRONFIELD) LTD.,

Dronfield, Sheffield.

Manufactured at—Mickley Colliery, Mickley Lane.
Coal Employed—Mickley Thin Seam.
Shipping Ports—Hull and Goole.
Rail—Midland, Dronfield and Dore-and-Totley Stations.
Canal— . . .

Foundry and Blast Furnace Coke.

FIRST ANALYSIS WITHOUT WASHING.

Composition.	As received. Per cent.	After drying. Per cent.
Moisture	0·11	0·00
Volatile matter	0·89	0·89
Fixed carbonaceous matter	93·49	93·59
Mineral matter (ash)	5·51	5·52
	100·00	100·00
Sulphur	1·69	1·70

Analysts—H. Allen and Partners, G. E. Scott and Smith, Sheffield.
Date of Analysis—September 4, 1905.

SECOND ANALYSIS AFTER WASHING SLACK.

	Per cent.
Moisture	0·46
Ash	6·09
Sulphur	1·41
Carbon (by difference)	92·04
	100·00

This coke is low in ash compared with the average coke of South and West Yorkshire. It is a very useful blast furnace coke, but would be improved by better grinding.

As the coke stands mechanically, it is suitable for foundry and steel melting purposes.

Analyst—W. McD. Mackey, Leeds.
Date of Analysis—January 26, 1906.

Notes.

DERBY.

SHEFFIELD COAL COMPANY LIMITED,

Birley, near Sheffield.

Manufactured at—Birley.

Coal Employed—Silkstone.

Shipping Ports—Humber Ports, Partington, Liverpool, King's Lynn.

Rail—Great Central (Woodhouse Junction Station), and Midland (North Staveley Junction).

Canal— . . . . . .

Birley Silkstone Washed Hard Coke.

The coke is used for steel melting, for brass and other foundry purposes, and also for furnaces.

Analysis—	Per cent.
Carbon	93·21
Ash	5·74
Sulphur	0·72
Water	0·33
	100·00

Analyst—Elliot Barker, F.C.S.

Date of Analysis—May, 1905.

DURHAM.

Notes.

BEARPARK COAL AND COKE COMPANY LIMITED,

Middlesbrough.

Manufactured at—Bearpark Brancepeth Colliery.
Coal Employed—Busty.
Shipping Ports—Tyne Dock and all North East Ports.
Rail—North Eastern, Aldin Grange Station.
Canal— . . . . . .

Bearpark Coke.

Average of numerous analyses—	Per cent.
Carbon	89·60
Sulphur	0·98
Ash	9·42
	100·00

Analysts—Pattinson and Stead, and F. E. Thompson.

Date of Analysis—1906.

BELL BROS. LIMITED,

Middlesbrough.

Manufactured at—South Brancepeth Colliery, near Durham.
Coal Employed—Busty and Brockwell Seams.
Rail—North Eastern, Spennymoor Station.
Canal— . . . . . .

South Brancepeth Coke.

	Per cent.
Moisture	1·64
Ash	7·08
Sulphur	0·91
Volatile matter	0·71
Fixed carbon	89·66
	100·00

Average analysis over two months—January and February 1906.

Analyst—Weldon Hanson.

Date of Analysis—January and February, 1906.

Notes.

DURHAM.

Manufactured at—Browney Colliery, near Durham.
Coal Employed—Busty, Brockwell and Hutton Seams.
Rail—North Eastern, Ferryhill Station.
Canal— . . . . . .

Browney Coke.

	Per cent
Moisture	3·00
Ash	8·05
Sulphur	1·03
Volatile matter	0·61
Fixed carbon	87·31
	100·00

Average analysis over two months—January and February 1906.

Analyst—Weldon Hanson.
Date of Analysis—January and February, 1906.

Manufactured at—Tursdale Colliery, near Durham.
Coal Employed—Busty and Brockwell Seams.
Rail—North Eastern, Ferryhill Station.
Canal— . . . . . .

Tursdale Coke.

	Per cent.
Moisture	2·64
Ash	9·96
Sulphur	1·04
Volatile matter	0·82
Fixed carbon	85·54
	100·00

Average analysis over two months—January and February 1906.

Analyst—Weldon Hanson.
Date of Analysis—January and February, 1906.

DURHAM. *Notes.*

CARTERTHORNE COLLIERY COMPANY LIMITED,

Zetland Buildings, Middlesbrough.

Manufactured at— . . . . . .
Coal Employed—Carterthorne Gas Coal.
Shipping Ports—Tyne Dock, West Hartlepool, Middlesbrough.
Rail—North Eastern, Evenwood Station.
Canal— . . . . . .

Carterthorne Gas Coal Coke.

	Per cent.
Carbon	96·02
Sulphur	0·76
Ash	3·22

Analysts—Pattinson and Stead.
Date of Analysis— . . . . . .

CONSETT IRON COMPANY LIMITED,

Blackhill, Co. Durham.

Manufactured at— . . . .
Coal Employed—
Shipping Port— . . . . . .
Rail— . . . . . Station.
Canal— . . . . . .

Consett Caresfield Coke.

Being the result of frequent tests at ironworks, to which the coke was supplied.

	Per cent.
Carbon	90·30
Ash	8·40
Sulphur	0·85
Water	0·45

Analyst— . . . . . .
Date of Analysis— . . . . . .

Langley Park Coke.

	Per cent.
Carbon	90·60
Ash	8·00
Sulphur	0·95
Moisture	0·45

Analyst— . . . . . .
Date of Analysis— . . . . . .

Notes.

DURHAM.

THE OWNERS OF HAMSTEELS COLLIERIES.

74, New Elvet, Durham.

Manufactured at—Hamsteels Collieries.
Coal Employed—Brockwell and Busty Seams, mixed.
Shipping Ports—All North East Ports.
Rail—North Eastern, Waterhouses Station.
Canal— . . . . . .

Middle Brancepeth Coke.

	Per cent.
Carbon	93·79
Ash	5·47
Sulphur	0·66
Moisture	0·08
	100·00
Phosphorus	0·003

Analysts—Pattinson and Stead.
Date of Analysis—December, 1905.

HAMSTERLEY COLLIERY LIMITED,

Milburn House, Newcastle-on-Tyne.

Manufactured at—Hamsterley Colliery, Ebchester, R.S.O.
Coal Employed— . . . . . .
Shipping Ports—Dunston and Tyne Dock.
Rail— . . . . . Station.
Canal— . . . . . .

Hamsterley Coke.

	Per cent.
Carbon	92·32
Sulphur	0·58
Ash	6·87
Moisture	0·23
	100·00

Analysts—J. and H. S. Pattinson.
Date of Analysis— . . . . . .

Notes.

DURHAM.

HETTON COAL COMPANY LIMITED,

Hetton-le-Hole.

Manufactured at—Lyons Colliery.
Coal Employed— . . . . . .
Shipping Ports—South Dock, and Hetton Staiths, Sunderland.
Rail—North Eastern, Hetton Station.
Canal— . . . . . .

Lyons Coke.

As analysed at works receiving regular supplies in 1889.

	Per cent.
Carbon	90·31
Ash	7·20
Sulphur	1·35
Moisture	1·14

Analyst— . . . . . .
Date of Analysis— . . . . , 1889.

HORDEN COLLIERIES LIMITED,

Crown Street Chambers, Darlington.

Manufactured at— . . . . . .
Coal Employed—Main Seam.
Shipping Ports—East and West Hartlepool, South Dock, Tees & Tyne.
Rail—North Eastern, ... Station.
Canal— . . . . . .

Horden Coke.

	Per cent.
Carbon	89·23
Ash	6·06
Sulphur	1·01
Moisture	3·70
	100·00
Phosphorus	·0023

Analyst—W. F. K. Stock.
Date of Analysis—February 18, 1904.

Notes

DURHAM.

LAMBTON COLLIERIES LIMITED,

Newcastle-on-Tyne.

Manufactured at— . . . . . .
Coal Employed—Lambton and Sherburn Washed Duff.
Shipping Ports—Lambton Staiths and Tyne Dock.
Rail— . . . . . Station.
Canal— . . . . . .

Sherburn and Lambton Coke.

	Sherburn. Per cent.	Lambton. Per cent.
Moisture	0·38	0·41
Ash	7·42	7·32
Fixed carbon	90·63	90·91
Sulphur	1·57	1·36
	100·00	100·00

Analyst—G. P. Lishman, D.Sc., F.I.C.
Date of Analysis—March, 1906.

LOW BEECHBURN COAL COMPANY LIMITED,

Darlington.

Manufactured at—Low Beechburn.
Coal Employed—Ballarat, Busty, Five Quarter and Main Coal.
Shipping Port—Middlesbrough.
Rail— . . . . . Station.
Canal— . . . . . .

Low Beechburn Coke.

	Per cent.
Carbon	90·40
Ash	8·70
Sulphur	0·77
Moisture	0·13

Analyst— . . . . . .
Date of Analysis—January, 1906.

DURHAM.

Notes.

PRIESTMAN COLLIERIES LIMITED,

Milburn House, Newcastle-on-Tyne.

Manufactured at— . . . . . .
Coal Employed— . . . . . .
Shipping Ports—Dunston and Tyne Dock.
Rail— . . . . . Station.
Canal— . . . . . .

Waldridge Coke.

	Per cent.
Carbon	91·06
Sulphur	0·91
Ash	7·87
Moisture	0·16

Analysts—J. and H. Pattinson.
Date of Analysis— . . . . . .

Victoria Garesfield Coke.

	Per cent.
Carbon	92·89
Sulphur	0·68
Ash	6·43

Analysts—J. and H. Pattinson.
Date of Analysis— . . . . . .

Messrs. S. A. SADLER LIMITED,

Middlesbrough.

Manufactured at—Malton Colliery, near Durham, and Etherley Grange, Durham.
Coal Employed—Malton, Brockwell and Busty.
Shipping Ports—Middlesbrough, Tyne Dock and Sunderland.
Rail—North Eastern, Lanchester Station.
Canal— . . . . . .

Malton Foundry Coke.

	Per cent.
Carbon	90·86
Ash	8·20
Sulphur	0·94

Analyst—J. Preston.
Date of Analysis—September, 1906.

Notes.

DURHAM.

Malton Furnace Coke.

	Per cent.
Carbon	90·13
Ash	8·82
Sulphur	1·05

Analyst—J. Taylor.
Date of Analysis—September, 1906.

SOUTH HETTON COAL COMPANY LIMITED,

Sunderland.

Manufactured at—Murton Coke Works.
Coal Employed—South Hetton Murton Duff Coal.
Shipping Ports—Sunderland and Seaham Harbour
Rail—North Eastern, South Hetton Colliery Sidings.
Canal— . . . . . .

Murton Coke.

	Per cent.
Carbon	93·71
Ash	4·40
Sulphur	1·49
Moisture	0·40

Analyst—W. F. Keating Stock.
Date of Analysis— . . . . . .

STRAKERS & LOVE,

Newcastle-on-Tyne.

Manufactured at— . . . . . .
Coal Employed— . . . . . .
Shipping Ports—Tyne Dock, South Dock, Sunderland, Middlesbro' Dock, and all North East ports.
Rail— . . . . . Station.
Canal— . . . . . .

Brancepeth Coke.

	Per cent.
Carbon	95·77
Sulphur	0·71
Ash	3·40
Water	0·12

DURHAM.

Notes.

The coke is probably the finest produced in the Durham coalfield; it is considered a standard quality for purposes of comparison, and is shipped to all parts of the world.

From works where the coke is in constant use, the highest percentage of sulphur contained in it is stated to have been 0·84

Analyst—John Pattinson.
Date of Analysis—April 16, 1887.

WEARDALE STEEL, COAL AND COKE COMPANY LIMITED,

Newcastle-on-Tyne.

Manufactured at— . . . . . .
Coal Employed— . . . . . .
Shipping Ports—Tyne, Middlesbrough, Hartlepool.
Rail— . . . . . Station.
Canal— . . . . . .

Black Prince Coke.

As analysed at ironworks over four months in 1885.

	1st. Per cent.	2nd. Per cent.	3rd. Per cent.	4th. Per cent.
Carbon	92·81	93·07	93·59	94·40
Ash	5·60	5·40	5·10	4·10
Moisture	0·80	0·70	0·60	0·70
Sulphur	0·79	0·83	0·71	0·76

The average of ash in this coke in actual use was in the year 1884 4·97 per cent., and in 1883 5·50 per cent.

Analyst— . . . . . .
Date of Analysis— . , 1885.

Notes.

DURHAM.

THE OWNERS OF WEST STANLEY COLLIERY,

Newcastle-on-Tyne.

Manufactured at—West Stanley Colliery.

Coal Employed—Busty and Brockwell Seams.

Shipping Ports—Tyne Dock, Dunston, Sunderland, Blyth, Howdon and Albert Edward Docks, and Commissioners' Spouts.

Rail— . . . . . Shield Row Station.

Canal— . . . . . .

West Marley Hill Coke.

	Per cent.
Fixed carbon	93·64
Volatile hydrocarbons	0·60
Ash	5·36
Moisture	0·40
Sulphur	0·85

Analyst—W. H. Blake.

Date of Analysis– August 30, 1906.

Notes.

GLOUCESTER.

BEDMINSTER, EASTON, KINGSWOOD AND PARKFIELD COLLIERIES LIMITED,

Easton Colliery, Bristol.

Manufactured at—Kingswood Colliery.

Coal Employed— . . . . . .

Shipping Port— . . . . . .

Rail— . . . . . Fishponds Station.

Canal— . . . . . .

Kingswood Foundry Coke.

	Per cent.
Carbon	90·55
Sulphur	0·65
Ash	8·80
	100·00
Heating power	14·4

Analyst—Ernest H. Cook.

Date of Analysis—August 8, 1892

LYDNEY AND CRUMP MEADOW COLLIERIES COMPANY LIMITED,

Cinderford, Forest of Dean.

Manufactured at—Cinderford, Glos.

Coal Employed—Crumpmeadow Starkey.

Shipping Ports—Lydney, Sharpness, Newport and Cardiff.

Rail—Great Western Railway and Severn and Wye Joint Railway, Cinderford Station.

Canal—None.

Crump Meadow Starkey Hop Drying Coke.

	Per cent.
Moisture	0·20
Ash	5·15
Volatile matter	11·20
Fixed carbon	83·45
	100·00
	Per cent.
Total sulphur	0·988
Phosphorus	0·010
Total arsenic per pound of coke	$\frac{1}{85}$ grain

Analyst—G. R. Thompson.

Date of Analysis—August 25, 1905.

Notes.

LANCASHIRE.

ALTHAM COLLIERY COMPANY LIMITED,

Accrington.

Manufactured at—Altham Colliery (in Patent Ovens).
Coal Employed—Lower Mountain Mine.
Shipping Ports—Liverpool, Manchester.
Rail—Lancashire and Yorkshire, Simonstone Station.
Canal—Leeds and Liverpool.

Altham Patent Coke.

	Per cent.
Carbon	92·60
Sulphur	0·52
Ash	6·36
Moisture	0·52
	100·00

Analyst—Edward Riley, F.I.C., F.C.S.
Date of Analysis—July, 1904.

Manufactured at—Great Harwood Colliery.
Coal Employed—Lower Mountain Mine.
Shipping Port—Liverpool.
Rail—Lancashire and Yorkshire, Martholme Siding, Great Harwood Station.
Canal— . . . . . .

Altham Beehive Coke.

	Per cent.
Carbon	92·000
Ash	7·000
Sulphur	0·510
Moisture	0·490
	100·000

Analyst—N. Eltoft.
Date of Analysis—June 19, 1906.

LANCASHIRE.

Notes.

EXECUTORS OF COLONEL HARGREAVES,

Burnley.

Manufactured at—Burnley.
Coal Employed—Mountain Mine.
Shipping Port—Liverpool.
Rail—Lancashire and Yorkshire, Rose Grove Station.
Canal—Leeds and Liverpool.

Best Habergham Foundry Coke.

	Per cent.
Fixed carbon	93·70
Volatile matter	1·00
Moisture	0·20
Ash	5·10
Sulphur in ash	0·73

Analyst—Raymond Ross.
Date of Analysis—March 3, 1906.

Manufactured at—Burnley.
Coal Employed—"Gannister Beds of Coal."
Shipping Port—Liverpool.
Rail—Lancashire and Yorkshire, . . . Station.
Canal—Leeds and Liverpool.

Best Foundry Coke.

	Per cent.
Carbon	93·66
Sulphur	0·58
Ash	5·26

Analyst—Edward Riley.
Date of Analysis—March, 1905.

	Per cent.
Carbon	93·51
Sulphur	0·48
Ash	4·58

Analysts—Patterson and Stead.
Date of Analysis—March, 1905.

Notes.

LANCASHIRE.

Best Foundry Coke—*cont.*

	Per cent.
Carbon	93·00
Sulphur	0·50
Ash	4·90

Analyst—Mr. Raymond Ross.
Date of Analysis—March, 1905.

	Per cent.
Carbon	92·74
Sulphur	0·60
Ash	6·26

Analyst—Wm. McD. Mackey.
Date of Analysis—March, 1905.

MESSRS. GEO. HARGREAVES AND CO.,

The Collieries, Accrington.

Manufactured at—Huncoat.
Coal Employed—Lower Mountain Mine.
Shipping Ports—Fleetwood and Manchester.
Rail—Lancashire and Yorkshire, Accrington Station.
Canal— . . . . . .

Lower Mountain Mine Coke.

	Per cent.
Carbon	91·95
Sulphur	0·59
Ash	7·15
Moisture	0·31
	100·00

Analyst—Edward Riley.
Date of Analysis—October 17, 1904.

LANCASHIRE.

Notes.

PLATT BROS. AND CO. LIMITED,

Hartford Ironworks, Oldham.

Manufactured at—Butterworth Hall and Jubilee Collieries, Milnrow, near Rochdale.

Coal Employed—Mountain Mine.

Shipping Port— . . . . . .

Rail—Lancashire & Yorkshire, Milnrow and Jubilee Colliery Sidings.

Canal— . . . . . .

Milnrow and Jubilee Foundry Coke.

	No. 1. Per cent.	No. 2. Per cent.
Carbon	94·28	94·21
Sulphur	0·45	0·55
Moisture	0·22	0·16
Ash	5·05	5·08
	100·00	100·00

This is one of the finest qualities of foundry coke put on the English market.

Analyst—Mr. Tatlock, Glasgow.

Date of Analysis— . . . . . .

Notes.

MONMOUTH.

NEWPORT ABERCARN BLACK VEIN STEAM COAL COMPANY LIMITED,

Newbridge.

Manufactured at—Abercarn.
Coal Employed—Newport Abercarn Black Vein.
Shipping Ports—Newport, Cardiff, Penarth, Barry.
Rail—Great Western, Abercarn Station.

Newport Abercarn Black Vein Foundry Coke.

	Per cent.
Carbon	91·41
Sulphur	0·63
Ash	7·76
Moisture	0·20
	100·00

Analyst—Edward Riley, F.I.C., F.C.S.
Date of Analysis—February 16, 1903.

NORTHUMBERLAND.

ASHINGTON COAL COMPANY LIMITED,

Newcastle-on-Tyne.

Manufactured at— . . . . . .
Coal Employed—Ashington Washed Duff Coal.
Shipping Ports—Blyth and the Tyne.
Rail— . . . . . Ashington Station.

Ashington Duff Coal (Washed) Coke.

Coke	62·80
Ash in coke	11·30
Sulphur in coke	0·88

Analyst— . . . . . .
Date of Analysis— . . . . . .

Notes.

SHROPSHIRE

LILLESHALL COMPANY LIMITED,

Priors Lee Hall, Shifnal.

Manufactured at—Priors Lee and Lodge.
Coal Employed—Clod, Double and Flint
Shipping Port—None shipped, all used in own works.
Rail—G. W. R. and L. and N. W. R., Oakengates and Donnington Stations.
Canal—Humber Arm (S. N. C. Co.)

Prior's Lee Coke, Lodge Coke.

	Prior's Lee Coke. Per cent.	Lodge Coke. Per cent.
Carbon	86·57	84·25
Ash	11·25	13·05
Sulphur	1·08	1·37
Moisture	1·10	1·33
	100·00	100·00

Analyst—G. A. Jarvis, F.C.S.
Date of Analysis—March 10, 1906.

Notes.

YORKSHIRE.

CAMMELL, LAIRD AND CO. LIMITED,

New Oaks Colliery, near Barnsley.

Manufactured at—Oaks Collieries
Coal Employed— . . . . . .
Shipping Port— . . . . . .
Rail— . . . . . Station.
Canal— . . . . . .

The following is the result of an average from January to June, 1904, of the cokes sent to Cyclops Works:—

	Per cent.
Ash	3·803
Sulphur	1·052

The following is the result of an average for 1905, of coke sent to Cyclops Works:—

	Per cent.
Ash	4·179
Sulphur	1·214

Analyst— Deby.
Date of Analysis—

CARGO FLEET IRON COMPANY LIMITED,

Middlesbrough.

Manufactured at—Cargo Fleet Ironworks.
Coal Employed—From various collieries in Durham district.
Shipping Port—*Nil.*
Rail—North Eastern, Southbank Station.
Canal— . . . . . .

Cargo Fleet Coke.

	Per cent.
Fixed carbon	88·45
Ash	9·34
Sulphur	1·19
Moisture	1·02

Analyst—A. Braithwaite.
Date of Analysis—March 10-20, 1906.

YORKSHIRE.

Notes.

DALTON MAIN COLLIERIES LIMITED,

Parkgate, Rotherham.

Manufactured at—Silverwood Colliery. (By-product ovens.)
Coal Employed—Washed Smudge.
Shipping Ports—Hull, Goole, Grimsby, Keadby, Liverpool, Manchester Ship Canal, Boston.
Rail—Midland and Great Central Railways, Rawmarsh (Midland), Aldwarke (Great Central) Stations.
Canal—Sheffield and South Yorkshire Navigation.

Blast-furnace Coke.

	Per cent.
Moisture	0·90
Sulphur	1·18
Volatile matter	0·37
Ash	8·52
Carbon	89·03
	100·00

Analyst—G. L. Chrisp.
Date of Analysis—May 18, 1906.

S. FOX AND CO. LIMITED,

Stocksbridge, near Sheffield.

Manufactured at—Stocksbridge Works, near Sheffield.
Coal Employed—Halifax Soft Coal.
Shipping Port—None; all coke being consumed in own works.
Rail—Great Central, Deepcar Station.
Canal—None.

Steel Coke from Halifax Soft Coal.

	Per cent.
Carbon	90·86
Sulphur	·98
Ash	6·81
Moisture	1·35
	100·00
Calorific power	10·45 degs.

Analyst—R. Harris.
Date of Analysis—April 2, 1906.

Notes.

YORKSHIRE.

LIVERSEDGE COAL COMPANY,

Liversedge.

Manufactured at—Liversedge.

Coal Employed—Low Moor Better Bed Seam of Coal.

Shipping Port—None.

Rail—Lancs. and Yorks., Liversedge Station.

Canal—None.

Better Bed Special Foundry Coke.

	Per cent.
Moisture	0·13
Ash	6·53
Sulphur	0·48
Hydrogen, oxygen and nitrogen	0·68
Carbon (by difference)	92·18
	100·00

Analyst—The *Quarry* Investigation, Testing and Analysis Department, London.

Date of Analysis—September 11, 1906.

The sample submitted is a strong hard coke, with good lustre, and is, in our opinion, a coke of superior quality, and very suitable for use as a best foundry coke.

Working test—Furnace 28 in. at tuyeres; bed 5 cwt. coke.

	Iron. Cwt.	Coke. Lb.
First charge	9 ..	0
Second ,, ...	8 ..	56
Third ,, ...	8 .	56
Fourth ,, ...	8 ..	56
Fifth ,, ...	8 ..	56
Sixth ,, ...	8 ..	56
Seventh ,, ...	8 ..	56
Eighth ,, ...	8 ..	56
Ninth ,, ...	8 ..	56
Tenth ,, ...	8 ..	56
Eleventh ,, ...	5 ..	no coke
Iron melted	4 tons 5 cwt.	
Coke consumed, not reckoning drop ..	9½ cwt.	

Iron very hot. Type of furnace; receiver flat tuyeres.

Notes.

YORKSHIRE.

LOFTHOUSE COLLIERY COMPANY,

Lofthouse Colliery, near Wakefield.

Manufactured at—Lofthouse.
Coal Employed—Silkstone.
Shipping Ports—Goole, Hull.
Rail—Great Northern, Lofthouse Station.
Canal—Aire and Calder Navigation.

Lofthouse Coke.

Average analysis of three tests—	Per cent.
Moisture (given off at 212 degs. Fahr) ..	0·50
Combustible matter	91·38
Ash	8·12
	100·00
Total sulphur	0·91

Analyst—Thomas Fairley.
Date of Analysis—May 23, 1903.

LOW MOOR COAL COMPANY LIMITED,

Low Moor, Bradford.

Manufactured at—Low Moor.
Coal Employed—Low Moor Better Bed.
Shipping Port— . . . . . .
Rail—Lancs. and Yorks., Low Moor Station.
Canal— . . . . . .

Better Bed Coke.

	Per cent.
Ash	5·68
Sulphur	0·48
Moisture	0·69
Carbon	93·15
	100·00

Analyst—Wm. McD. Mackey.
Date of Analysis—June 19, 1902.

Notes.

YORKSHIRE.

NEWTON, CHAMBERS AND CO. LIMITED,

Thorncliffe, near Sheffield.

Manufactured at—Thorncliffe Collieries.
Coal Employed— . . . . . .
Shipping Port— . . . . . .
Rail— . . . . . Station.
Canal— . . . . . .

Foundry Coke.

	Per cent.
Carbon	91·37
Ash	7·56
Sulphur	0·82
Moisture	0·25
	100·00

Analyst— . . . . . .
Date of Analysis— . . . . . .

OLD SILKSTONE COLLIERIES LIMITED,

Dodworth, near Barnsley.

Manufactured at—Old Silkstone Collieries.
Coal Employed— . . . . . .
Shipping Ports—Keadby, Hull, Goole, Grimsby, Partington, Liverpool, &c.
Rail—Great Central, Dodworth Station.
Canal— . . . . . .

Dodworth Furnace Coke (Unwashed).

	Per cent.
Ash	12·90
Sulphur	1·25
Moisture	1·42
Carbon (by difference)	83·93
	100·00

Analyst— . . . . . .
Date of Analysis— . . . . . .

Old Silkstone Special Foundry Coke.

	Per cent.
Ash	6·60
Sulphur	0·71
Moisture	0·24
Carbon (by difference)	92·45
	100·00

Analyst— . . . . . .
Date of Analysis— . . . . . .

Notes.

DUMBARTON.

J. AND A. F. WALLACE,

Kirkintilloch.

Manufactured at—Wester Gartshore Colliery.
Coal Employed—Coking Coal (Kilsyth).
Shipping Ports—Queen's Dock, Bo'ness.
Rail—North British, Wester Gartshore Siding.
Canal—Forth and Clyde.

Wester Gartshore Foundry Coke.

The sample was nearly 4 ft. in depth, representing the contents of the coke oven from top to bottom.

	Per cent.
Carbonaceous or combustible matter	93·74
Sulphur	0·48
Ash	5·08
Water	0·70
	100·00
Heat units derived from the burning of the coke, Centigrade	7,765
Heat units derived from the burning of the coke, Fahrenheit	13,977
Heating or evaporating power (theoretical), in pounds of boiling water converted into steam by 1 lb. of coke	14·38 lb.
Evaporative power (practical) in the same terms	13·21 lb.

Analyst—William Wallace.
Date of Analysis—May 28, 1888

Notes.

LANARKSHIRE.

DARNGAVIL COAL COMPANY LIMITED,

40, St. Enoch Square, Glasgow.

Manufactured at—Dalserf Coke Works.
Coal Employed—Lower Drumgray.
Shipping Ports—Glasgow, Greenock, Bo'ness, Grangemouth, Leith, Granton.
Rail—Caledonian, Stonehouse Station.
Canal— . . . . . .

Swinhill Foundry Coke.

	Per cent.
Volatile matter	1·95
Fixed carbon	93·00
Sulphur	0·90
Ash	3·75
Water	0·40
	100·00

Analysts—R. R. Tatlock and Thomson.

Date of Analysis—December 15, 1903.

Notes.

STIRLING (EAST).

ALLOA COAL COMPANY LIMITED,

Alloa.

Manufactured at—Bannockburn Colliery and Carnock Colliery.
Coal Employed—Bannockburn Coking Gas Coal.
Shipping Ports—Glasgow, Greenock, Grangemouth, Bo'ness, Dundee, Leith, Alloa.
Rail—Caledonian, Plean Station.
Canal—None.

Malting Coke.

	Per cent.
Carbon	94·76
Sulphur	0·45
Ash	4·67
Water at 212 degs. Fahr.	0·12
	100·00

Specific gravity of coke	·861 (water 1·000)
Weight of 1 cubic foot	53·81 lb.

Heating power of coke as determined by Thomson's calorimeter :—1 lb. of coke evolves heat sufficient to convert 13·8 lb. of water from 212 degs. Fahr. into steam.

This coke is of remarkable chemical purity, containing a very small percentage of ash ; the amouut of sulphur present is exceptionally low, while in physical properties it is hard and compact, possessing a good steel grey colour, and is undoubtedly a first-class coke.

Analyst—J. W. Napier, F.C.S., M.S.C.I.
Date of Analysis—December 18, 1905.

Coal Employed—Bannockburn Wallsend.

The Alloa Coal Company's Foundry Coke.

	Per cent.
Carbon	96·68
Sulphur	0·36
Ash	2·90
Water at 212 degs.	0 06
	100·00

Specific gravity of the coke	·661 (water 1·000).
Weight of 1 cubic foot	41·31 lb.

Notes.

STIRLING (EAST).

The Alloa Coal Company's Foundry Coke—*cont.*

Heating power of the coke as determined by Thomson's calorimeter:—1 lb. of the coke by perfect combustion evolves heat sufficient to convert 14·0 lb. of water from 212 degs. Fahr. into steam.

This is a foundry or kiln coke of remarkable chemical purity, containing an exceptionally small percentage of sulphur and ash, while in physical properties it possesses all the other essential characteristics of a first-class, or ideal, coke for foundry or iron-smelting purposes. It is exceptionally hard and compact, of light steel-grey colour, and columnar or prismatic in form while in large pieces.

Analyst—Geo. R. Hislop, F.C.S., F.I.Inst., F.R.S.S.A.

Date of Analysis—December 4, 1894.

PLEAN COLLIERY COMPANY LIMITED,

65, Renfield Street, Glasgow.

Manufactured at—Plean Collieries, Plean.

Coal Employed—Bannockburn.

Shipping Ports—Glasgow, Ardrossan, Greenock, Grangemouth, Bo'ness, Methil, Burntisland, Leith, Granton.

Rail—Caledonian, Plean Station.

Canal— . . . . . .

Plean Foundry Coke.

A sample of this coke gave on examination the following results:—

	Per cent.	Lb. per ton.
Carbon	92·44	2,070·656
Sulphur	0·39	8·736
Ash	5·75	128·800
Water	1·42	31·808
	100·00	2,240·000

Specific gravity	·604 (water 1·000)
Weight of 1 cubic foot	37·75

Heating power of the coke as determined by Thomson's calorimeter:—1 lb. of the coke by perfect combustion generates heat sufficient to convert 12·65 lb. of water from 212 degs Fahr. into steam.

Analyst—Geo. R. Hislop, F.C.S., F.R.S.S.A.

Date of Analysis—April 4, 1896.

Notes

GLAMORGANSHIRE.

CORY BROS. AND CO. LIMITED,

Cardiff.

Manufactured at— . . . . . .
Coal Employed— . . . . . .
Shipping Port— . . . . . .
Rail— . . . . . Station.
Canal— . . . . . .

Cory's Foundry Coke.

	Per cent.
Moisture	0·58
Ash	4·17
Sulphur	0·57
Carbon	94·68
	100·00

Analyst—F. Gwilym Treharne, F.R.M.S.
Date of Analysis— . . . . . .

Cory's Washed Furnace Coke.

	Per cent.
Fixed carbon	92·69
Ash	5·63
Sulphur	1·09
Moisture	0·59
	100·00

Analyst—F. Gwilym Treharne, F.R.M.S.
Date of Analysis— . . . . . .

Cory's Second Quality Foundry Coke.

	Per cent.
Carbon	92·04
Hydrogen	0·21
Oxygen	0·33
Nitrogen	0·07
Sulphur	0·93
Ash (mineral matter)	6·27
Water (moisture)	0·15
	100·00

Analyst—J. W. Thomas, F.C.S., F.Inst.Chem.
Date of Analysis— . . . . . .

Notes.

GLAMORGANSHIRE.

GREAT WESTERN COLLIERY COMPANY LIMITED,

The Exchange, Bristol.

Manufactured at—Pontypridd.

Coal Employed— . . . . . .

Shipping Ports—Cardiff, Penarth, Barry, Newport, Port Talbot, Swansea.

Rail—Taff Vale, Pontypridd Station.

Canal—None.

Foundry and Furnace Coke.

Made out of washed and ground coal from the Great Western Colliery Company's pits and burned in Coppée and Otto ovens.

	Per cent.
Carbon (by difference)	93·234
Sulphur	0·774
Phosphorus	0·022
Ash	5·970
	100·000

Analyst—F. G. Treharne.

Date of Analysis— . . . . . .

PYMAN, WATSON AND CO. LIMITED,

Cardiff.

Manufactured at—Ffaldau Collieries.

Coal Employed—Coking.

Shipping Ports—Cardiff, Port Talbot, Swansea.

Rail—Great Western, Pontycymmer Station.

Canal— . . . . . .

Ffaldau Foundry Coke.

Sample dried at 212 degs. Fahr.

	Per cent.
Carbon (by difference)	94·317
Sulphur	0·691
Phosphorus	0·016
Ash	4·976
	100·000

The coke is of excellent quality, capable of carrying a heavy burden. Its low content of sulphur and phosphorus is of great advantage, and makes it of special value to those who are manufacturing low phosphorus steel.

Analyst—F. G. Treharne, F.C.S.

Date of Analysis—January 23, 1904.

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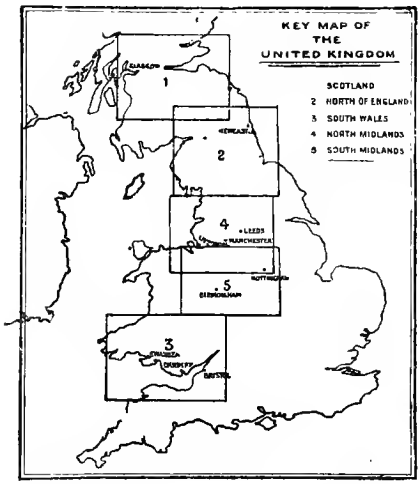

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